PUBLIC HEALTH REPORTS

VOL. 35 JANUARY 16, 1920. No. 3

TREATMENT AND DISPOSAL OF SEWAGE.

BRIEF DESCRIPTIONS OF METHODS, PROCESSES, AND STRUCTURES USED IN THE TREATMENT AND DISPOSAL OF SEWAGE IN THE UNITED STATES, WITH BIBLIOGRAPHY.

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INTRODUCTION.

This memorandum has been prepared for the purpose of calling attention to methods, structures, and special processes for the treatment and disposal of sewage in the United States.

The descriptions have been made brief and of a very general nature, since it would be impossible to include a complete history of sewage disposal in such a memorandum on the subject. The information is sufficient, however, to give a general idea of the various methods of disposal, and references have been made to literature where complete data may be obtained on the design and operation of any combination of treatment devices discussed in the text.

There is given in the appendix a list of reports covering investigations and recommendations, together with other data relating to sewage disposal for some of the larger cities of the United States. Especial attention is called to the Report of the Metropolitan Sewerage Commission of New York City and to the reports of the Sewerage Commission of the City of Milwaukee. The former contains a very comprehensive review of modern sewage disposal practice, and the latter contains the latest data on the recently developed activated sludge process of treatment.

DILUTION.

The disposal of sewage by dilution consists of its discharge into natural bodies of water, in some cases with and in others without preliminary treatment. In the former instances it constitutes a single and complete method of disposal. In the latter it may be regarded as the final step of a more or less elaborate system of treatment, in which it is employed in conjunction with one or more artificial processes.

Wherever sewage or a sewage effluent is discharged into a natural watercourse, dilution constitutes an integral part of the disposal process.

Dilution has for a long time been the most common means of sewage disposal practiced in the United States. Formerly it was regarded as a temporary and undesirable expedient, to be ultimately abandoned as soon as sewage purification became sufficiently developed. During recent years, however, the economic need for utilizing to the greatest possible extent the self-purification capacity of natural watercourses has been apparent, with the result that the disposal of community wastes by natural dilution has become recognized as a legitimate and desirable process where carried out in such a manner as not to endanger the public health.

Where dilution is successfully applied, it must in general accomplish one or both of the two following results, depending upon the uses to which the receiving body of water is to be subsequently devoted:

1. The limitation of bacterial numbers present in the receiving watercourse to within boundaries safely consistent with the hygienic safety of whatever sources of water supply, bathing beaches, or shellfish areas may be dependent upon such a watercourse.

2. The maintenance of a sufficient reserve supply of dissolved oxygen in the receiving watercourse to insure its freedom from objectionable odors or other conditions, either locally or at more distant points.

In general, the degree of dilution necessary to satisfy the first of these requirements is much higher than that required for the second, although this principle may not necessarily hold if careful local precautions relative to the proper dispersion of sewage are neglected.

The prescription of definite quantitative standards with reference to the dilution of normal sewage has for a long time engaged the attention of sanitary engineers. The first authoritative standard of this sort proposed in the United States was that of Hering, Williams, and Artingstall[1] in 1887, who concluded from a study of data for the design of the Chicago drainage canal that the minimum flow of the canal safely consistent with the avoidance of objectionable conditions should be 3.3 cubic feet per second per thousand of waste-contributing population. This standard was widely accepted for many years.

More recently, however, a further knowledge of the variable part played by self-purification in determining the capacity of water courses for pollution has resulted in a greater degree of caution in attempting to adopt and apply widely any fixed standard of dilu-

[1] Hering, R., Transactions of Am. Public Health Assoc., Vol. XIII.

tion which must be met at the point of sewage outfall. On the contrary, the present tendency in the United States is in the direction of prescribing standards as to maximum bacterial loads imposable upon water purification plants at the intake, and as to the minimum permissible degree of dissolved oxygen saturation at critical points consistent with the avoidance of nuisance. An example of the former is the so-called International Joint Commission Standard [1] which states that the maximum safe bacterial load imposable upon a modern efficient water purification plant should be such that no more than 50 per cent of 0.1 c. c. portions of the raw water, tested regularly throughout the year, should contain *B. coli*. In terms of the commonly employed *B. coli* index, this is equivalent to a yearly average bacterial load of not exceeding 500 *B. coli* per 100 c. c. An example of the second type of standard noted above is that which was proposed by Black and Phelps [2] as governing the minimum permissible dissolved oxygen content of New York Harbor. This standard, which was given as not less than 70 per cent oxygen saturation, is not concurred in by Fuller, who states [3] that 20 per cent for winter conditions and 30 per cent for summer (each equivalent to about 2.5 parts per million of dissolved oxygen) represent a more practical and generally accepted minimum.

Still more recently the United States Public Health Service has conducted in the Ohio River Basin probably the most intensive scientific study of stream pollution which has ever been carried out. The results obtained from this study, the publication of which is now under way, have thrown considerable new light upon the entire matter of standards of dilution as well as upon the fundamental principles underlying the disposal of community wastes by this method. They have emphasized the great need for caution in applying any fixed standards of dilution to widely varying conditions. At the same time they have shown conclusively that the combined resources of natural dilution and self-purification represent a tremendous economic asset which, in a given case, may be evaluated in definite quantitative terms through properly planned preliminary studies. Such resources should be utilized to the fullest possible extent in connection with any proposed project of sewage treatment involving artificial processes in order that the cost of the latter may be minimized.

A full description of the theory and practice of dilution processes is given by Metcalf and Eddy and by Fuller in the general references (15 and 16) accompanying the present discussion.

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[1] International Joint Commission, Final Report on Pollution of Boundary Waters.
[2] See reference No. 14 in bibliography to present section.
[3] Fuller, G. W., sewage disposal, 1st edition, pp. 217–218.

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3. Chicago Drainage Canal—Efficiency of Disposal by Dilution: Engineering Record, vol. 63, p. 79.
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6. Dilution and Sewage Treatment—Testimony of Sanitary Experts on Pollution of Great Lakes Boundary Waters before International Joint Commission; Engineering Record, vol. 70, pp. 128 and 174.
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13. Disposal of Greater New York's Sewage, by Charles E. Gregory: Municipal Journal, November 4, 1915. (Abstract of paper before Municipal Engineers of New York. General plan outlined; discussion of digesting power of harbor. A valuable and practical paper.)
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19. Annual Reports, Metropolitan Sewerage Commission, New York City, 1912 and 1914.
20. Report on Sewage Disposal System of Rochester, N. Y. E. A. Fisher, city engineer, April, 1913.

GRIT CHAMBERS.

In combined sewerage systems, considerable amounts of coarse mineral matter enter the sewers. Where sewage is pumped or treated, or both, it is generally advisable to remove this matter in order to prevent injury to the pumps and interference with the treatment processes. To accomplish this removal, the sewage is passed through small tanks so designed as to reduce the velocity to a point where deposition of this suspended mineral matter will take place, but not to a point where deposition of the organic matter in suspension will take place. In general this velocity should not average less than 1 foot per second.

As constructed, grit chambers precede the screens and are in two or more units in order to facilitate cleaning.

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SCREENING.

Screens have been used in connection with sewage disposal since the installation of the first sewage-pumping plants. Originally they were installed to remove coarse material that would tend to clog and break the pumps, but later they came into use for removing the finer particles from sewage that caused trouble in operating treatment plants, or produced nuisance in bodies of water receiving raw sewage. Those used for protecting sewage pumps have been classed as coarse screens, while those installed to remove finer particles have been referred to as fine screens. There is no general agreement as to what constitutes a coarse or a fine screen except as to the purpose for which they are installed.

There are many designs for coarse screens, but the type most generally used consists of vertical bars spaced 1 inch to 4 inches apart, and set in frames inclined 30° to 45° from the vertical. They may be cleaned in place by hand-raking or they may be lifted mechanically and raked. There are no particular difficulties involved in designing screens of this type, and for special references to installations in this country attention is called to the bibliography at the end of this chapter.

Fine screens first came into prominence in Europe, but recently they have been given considerable attention in this country. The first large installation was the revolving cylindrical screen at Reading, Pa. It was operated to remove the coarse suspended matter from raw sewage so as to prevent the heavy scum formation in the septic tanks, and the clogging of the sprinkling nozzles. At Baltimore, Md., a large cylindrical screen was operated to remove the floating particles from the effluent of the septic tanks that had caused clogging of the nozzles of the filters. The original screen at Reading was covered with 40-mesh monel metal wire cloth and protected by a $\frac{5}{8}$-inch mesh screen of No. 12 copper wire. In later installations of this type of screen at other cities by the designer, 30 and 32-mesh wire cloth were recommended. The Baltimore screen was covered with 26-mesh monel metal cloth supported by heavy copper wire cloth. There was only a small amount of material to be removed by the Baltimore screen, and the cost of operation was very low; while at Reading the suspended matter removed from the raw sewage was relatively high and the cost of operation likewise was in proportion. These two screens represent the practice of screening sewage where treatment plants are in operation.

Fine screens have also been considered extensively in connection with the disposal of sewage by dilution. The visible surface pollution of the water-fronts of many of our rivers and harbors has become a nuisance before the diluting capacity of the body of water has been reached. In such cases it has been recommended that the sewage be passed through fine screens in order to remove the material that rises to the surface. The Riensch-Wurl screen has been installed in many places in this country to remove coarse material from sewage preparatory to discharging into water courses. The tests of this screen at Cleveland, Ohio, and Brooklyn, N. Y., are of special interest, and the Report of the Metropolitan Sewerage Commission of New York City throws much light on the whole subject of fine screens. References to the reports mentioned above and all other important installations or tests are given in the bibliography at the close of this chapter.

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SEWAGE TREATMENT TANKS.

In order to remove from sewage finely divided suspended and colloidal matter which readily passes through screens and grit chambers, sedimentation has been widely used. Sedimentation processes are of two general types: plain sedimentation, where mechanical settling is alone attempted, and sedimentation combined with some form of

sludge digestion for reducing the volume of sludge obtained in the settling process in which the bacterial action plays a part.

Plain sedimentation.—Plain sedimentation of sewage may be effected either by allowing the liquid to stand in tanks for a certain period of time or by allowing it to flow slowly and continuously through tanks while the suspended matter settles to the bottom. Owing to practical difficulties of operation of the former method, continuous-flow tanks are preferred. Many studies of sedimentation have been made, the results of which are to be found in the literature on the subject. The period of detention is an important factor in the design and ranges from 30 minutes to 6 hours. Longer periods are generally unnecessary and may even prove detrimental if the effluent is to undergo further treatment.

Plain sedimentation tanks may be either of the horizontal or vertical flow type. Horizontal tanks may have level or inclined bottoms, the latter usually being deepest at the inlet end. Circular, vertical-flow tanks may have conical bottoms for sludge storage, with the inlet above the conical section and the outlet at the top of the tank. In order to operate, the upward velocity of flow in vertical tanks must be less than the downward rate of travel of the settling material. The Dortmund and Watson tanks are examples of the vertical-flow principle.

Chemical precipitation.—In order to hasten and extend the action of plain sedimentation, chemicals of various kinds may be added to the sewage which will coagulate and envelop or combine with the suspended, colloidal, or soluble matter and carry it to the bottom of the tank. The most common chemicals used are lime, alum, ferrous sulphate, ferric sulphate, and alumino-ferric. The degree of precipitation effected depends upon the amount of chemicals used. From 65 to 90 per cent of suspended matter is generally removed by this method, though the cost is at times prohibitive. The effluent is comparatively clear with decreased bacterial content. Large quantities of sludge are formed, which is usually costly to dispose of, and this is one of the principal objections to the method.

Septic tanks.—Various forms of tanks have been devised to liquefy the settled material and make its further disposal less costly and objectionable. The Cameron septic tank was one of the first steps in this direction. It consisted of a tightly covered horizontal flow tank, in which the period of detention was extended to about 24 hours, to allow anaerobic bacteria to liquefy the settled sludge. Considerable quantities of gases are generated, which in escaping tend to nullify in part the sedimentation process. The odor of the effluent is often marked, and it may contain substances that render its further treat-

ment difficult. This form of treatment has been practically abandoned in favor of more satisfactory methods of disposal.

Travis tanks.—Two-story tanks of various design are intended to allow sludge decomposition to proceed separately from the sedimentation process of the raw sewage. The original Travis, or hydrolytic tank, consisted of a horizontal chamber with semicircular bottom divided longitudinally into three compartments by means of two division walls starting at the bottom sides and extending upward and sloping inward at an angle of 45 degrees until nearly meeting, then extending vertically to the top of the tank. Slots at the bottom of the division walls allowed the sludge from the sedimentation compartments at the sides, together with some fresh sewage, to flow into the central division, there to undergo further digestion or decomposition. Still further treatment of the effluent was obtained by passing it upward through coarse stone filters, called hydrolyzing chambers.

Imhoff tanks.—The most satisfactory type of two-story sedimentation and sludge-digestion tank in general use is known as the Emscher, or Imhoff tank, named for its inventor, Dr. Carl Imhoff. This tank is similar in many respects to the Travis tank, except that no sewage is allowed to enter the sludge chamber, and the sedimentation period is shorter.

Imhoff tanks are of two general types: the radial or down-and-up flow, and the longitudinal flow. The former type is circular in plan, while the latter, which is generally used, may be circular, square, or rectangular. The sedimentation chamber forms the upper story and has a sloping bottom with slots through which the settled sludge slides into the digestion chamber underneath. The slots are trapped in such manner as to prevent the passage of gases through the sedimentation chamber.

The detention period of sewage in the Imhoff tank ranges from $2\frac{1}{2}$ to 3 hours and the velocity is approximately 0.6 feet per minute through the sedimentation chamber. The amount of suspended matter removed varies with different sewages, but in general it ranges from 55 to 75 per cent. The sludge chambers are usually designed to hold from six to eight months' accumulation of sludge.

Advantages claimed for the Imhoff tank method of treatment are the production of a fresh, nonseptic effluent and a sludge low in amount, inoffensive, and readily dried. Many large-sized installations of Imhoff tanks have been made, the literature of which is quite complete.

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SLUDGE.

The disposal of the sludge that accumulates in the various forms of tanks that have been developed for removing suspended matter from sewage has been one of the most difficult problems that sanitary engineers have been called upon to solve in connection with the purification of sewage. Three methods of disposal have been used: (1) hauling the sludge out to sea and dumping it; (2) air-drying on open shallow filter beds; (3) dewatering in filter presses.

Disposal at sea.—The method of disposal at sea, obviously, is applicable only to cities located on the seashore. The sludge is pumped from the settling tanks into tank steamers and hauled out to sea and dumped. It is practical and probably the cheapest way to dispose of sludge. There are no cities in the United States located on the seaboard that have disposal plants which dispose of their fresh sludge in this manner. The city of Providence, R. I., however, hauls the pressed sludge to sea and dumps it.

Air-drying on open beds.—Air-drying on open beds is the method generally practiced in this country. The beds are ordinarily composed of one foot of sand, about four inches of coarse gravel, and tile underdrainage. Earth embankments are thrown up around the sand and the sludge is run on to a depth of 8 to 10 inches. If more than 8 to 10 inches of sludge is applied to the beds it will dry at the surface and the sand will clog at the top, thus leaving a layer of wet sludge in between. In shallow layers the surface cracks will extend through to the sand, and the sludge will dry to a spadable condition in 15 to 20 days during the summer time. After drying, the sludge is hauled away either in small cars or on wagons to dumps. In a few places it is sold as fertilizer to farmers at a nominal sum. For smaller cities this method is practical and economical; but for the large centers of population it may be expensive, and may also give rise to nuisance from the odors arising from the exposure of such a large area of fresh sludge. No other method, however, has been developed to take the place of air-drying that is economically feasible.

Sludge pressing.—The pressing method of removing water from sludge so that it can be hauled away and be disposed of has been in use in this country and abroad for many years. At Worcester, Mass., filter presses were installed in 1898, and at Providence, R. I., about 1901, but the principle has never been generally accepted as the most economical method. Within the last few years, however, considerable interest has been taken in sludge pressing, owing to new developments in treating sewage by the activated sludge method. By this system a large volume of sludge of a high water content (98 per cent) is obtained that has high fertilizing ingredients. In order

for this method to become practical it is necessary to develop some scheme for dewatering the sludge that is more practical than air-drying and less expensive than filter pressing with the older types of presses. This subject has been investigated by several municipalities during the last few years, and progress is reported especially at Milwaukee, Wis. References to reports on experiments made there are given on pages 122–123, and references are given at the end of this chapter to other reports that have been made not only on filter pressing but on other methods employed to dewater and dispose of sludge.

Screenings from coarse and fine screens may be considered as sludge as regards the methods of dewatering. The coarse material can be easily pressed in most any form of machine with success. At many plants presses that are ordinarily used for pressing cider out of apples have been found to work satisfactorily. Centrifugal machines have been used at Reading, Pa., with good results. The dried screenings are burned under the boilers of the pumping stations. The suspended matter removed by fine screens is not as readily pressed as that from the coarse screens; but with this material, presses have given excellent results, and centrifugal machines have also been found satisfactory.

The second and third methods referred to in the preceding paragraphs are employed primarily for drying the sludge. This is, however, the most difficult and expensive part of the disposal, as the actual hauling away of the partially dried cake is not a difficult matter. To offset the cost of drying many attempts have been made to obtain grease and fertilizer from the sludge. Until the development of the activated sludge process little headway was made; but recently the tests made at Milwaukee and at the Stock Yards at Chicago indicate that sludge may be disposed of as a commercial product and the entire cost of drying repaid by the sale of the sludge.

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SEWAGE FILTERS.

There are three general types of filters which are at present employed in the United States in connection with sewage treatment. These are as follows:

1. Contact filters.
2. Trickling or sprinkling filters.
3. Intermittent sand filters.

The main function of all three types of filters is primarily the stabilizing of the organic constituents of sewage oxidation, though intermittent sand filters in addition remove very high percentages of bacteria. Each type of filter will be discussed briefly.

Contact filters.—The contact type of filter, which is described fully by Metcalf and Eddy[1] and by Fuller,[2] consists of a tight tank filled with broken stone and provided with regulating devices for

[1] Metcalf and Eddy, American Sewerage Practice, vol. III, Disposal of Sewage, pp. 223–227; also chapter XLV.
[2] Fuller, G. W., Sewage Disposal, chapter XX.

controlling both inflow and outflow. The ordinary cycle of operation of these filters consists of filling them with sewage, allowing them to stand full for a specified period (termed the "contact period"), emptying them, and allowing them to rest for a relatively long period (termed the "rest period"). Metcalf and Eddy (loc. cit., p. 223) give the following as an average operation schedule:

	Hours
Time of filling	1.0
Time of contact	.75
Time of emptying	.25
Time of resting	6.00
Time of cycle	8.00

The contact bed, which was developed previous to the sprinking filter, represents what was virtually the first logical step in evolving an intensive oxidizing machine from plain tank treatment. For this purpose it has been largely supplanted by the trickling filter, which has proved to be fully as efficient and considerably more economical in its per capita cost. Many filters of this type are in successful operation, however, particularly in the smaller plants. When properly operated they have one advantage over trickling filters when installed in the immediate neighborhood of residences; namely, their greater degree of freedom from odors. Their economic disadvantages, however, combined with their greater difficulty of successful operation, especially in large installations, have in general forced them to give way to the trickling filter.

Trickling filters.—The trickling (sometimes termed "sprinkling" or "percolating") filter represents a further step in the evolution of the contact bed in an effort to produce a more efficient and economical apparatus for oxidizing the putrescible matters of sewage. The filtering medium employed is similar to that which is used in contact filters, but it is so arranged as to facilitate as far as possible the free access of air throughout the interior of the bed. The method of applying sewage to this type of filter consists of spraying it as uniformly as possible over the surface of the bed, allowing it to percolate freely through the medium to a tight underdrain floor, whence the effluent is conveyed to outflow conduits. Ordinarily the sewage is applied intermittently, the regulation of dosage being automatic. An average operation schedule consists of about 5 minutes of application followed by about 10 minutes of rest. The particular schedule adopted depends upon local conditions.

The active purifying element of trickling filters consists of films of bacterial zooglea which form on the surfaces of the broken stone or slag composing the medium. Until these films form and the filter is "ripe," it accomplishes practically no work. The material com-

posing the films, which is virtually activated sludge,[1] removes, by adsorption and absorption, the suspended and dissolved organic substances brought into contact with it. The activities of aerobic bacteria growing within the films then bring about the oxidation of such substances, the basic supply of oxygen for this process being supplied by the air circulating within the bed. The stabilized products of oxidation resulting from this process are gradually returned in solution to the films of percolating sewage and thus carried off in the effluent. This, in brief, is the mechanism of the oxidation process.

The depth of trickling filters at present in use in the United States varies from about 5 feet (as at Columbus, Ohio), to as much as 9 feet (as at Baltimore, Md.). Still deeper filters have been proposed for Indianapolis, Ind., by Mr. Fuller, as described in reference No. 16 of the bibliography of this section. In general, the permissible rate of application of sewage to trickling filters consistent with good results is roughly proportional to their depth. This rate varies from about 2.0 million gallons per acre daily for 5 and 6 foot depth filters to about 2.5 million gallons for those of 9 foot depth.

Trickling filters perform efficiently under a wide range of seasonal conditons, their general activity, however, being somewhat less in winter than in summer. During the cold season the bacterial films accumulate to their maximum thickness. With the advent of spring and an increasing activity of numerous worms and larvæ inhabiting the beds, the films become loosened and slough off, producing the self-cleansing or unloading phenomenon which is characteristic of this type of filter. Periodic unloadings may occur throughout the summer.

Well designed and operated trickling filters ordinarily produce an effluent containing, in the form of nitrites, nitrates, and dissolved oxygen, fully 90 per cent of the total oxygen required to satisfy its residual oxygen demand. Excepting during unloading periods such filters also bring about a considerable degree of clarification and bacterial removal. Since the suspended matter contained in the filter effluent is more or less agglutinated and readily subsides, a comparatively brief period of sedimentation following filtration will bring about a marked improvement in the physical and bacterial characteristics of such an effluent.

The trickling filter is frequently employed in conjunction with preliminary sedimentation and screening processes for the purpose of producing a highly stable effluent. Where a high degree of removal of suspended matter and bacteria is also desired, secondary sedi-

[1] See discussion entitled "Activated Sludge," page 121.

mentation of the filter effluent, followed in some cases by disinfection, is practiced. In order to minimize the clogging of spray nozzles it is customary to pass the sewage through fine screens before applying it to the filters. This type of filter is at present considered the most practicable and economical means available for oxidizing sewage. A full description of it is given by Metcalf and Eddy in chapter XV, and by Fuller in chapter XXI, of the general references numbered 25 and 24, respectively, of the bibliography accompanying the present section. An outline of the theory underlying this type of filter is given by Metcalf and Eddy on pages 227 to 231 of the former reference.

Intermittent sand filters.—The application of intermittent sand filtration to the treatment of sewage, which was inaugurated at the Lawrence (Mass.) Experiment Station in the late eighties marked practically the first important step in the development of sewage purification in the United States. The subsequent use of this process, however, has largely been confined to the New England States and to other areas, principally along the Atlantic Coast, where natural deposits of sand are abundant.

The intermittent sand filter is extremely simple in construction, consisting of a layer of natural sand about 4 feet deep graded to a level surface and underdrained with either a deposit of natural sand or a tile underdrain system. It is provided with apparatus, usually radiating surface troughs, for distributing the sewage evenly over the filter, and, in some cases, with automatic devices for controlling the intermittency of application of the sewage.

The action of an intermittent sand filter consists of both mechanical straining and biochemical oxidation. The former mechanically removes a high proportion of the suspended matter and bacteria contained in the applied sewage, while the latter, by biochemical processes very similar to those taking place in the trickling filter, brings about an oxidation of dissolved organic matter into stable products. A large proportion of the mechanical straining action takes place in the upper layer of the filter, this being aided materially by the "ripening" of the sand grains and the deposition of a gelatinous zooglea mat at the surface. After a certain period of operation of the bed, it becomes clogged and must be cleaned. This is usually accomplished by removal of the top layers of sand and the accumulated mat. While, as noted above, the oxidizing action of this type of filter is similar to that of the trickling filter, the degree of nitrification which it accomplishes is in general greater.

The operation of intermittent filters is simple, consisting of the intermittent application of sewage from one to three times daily, fol-

lowed by draining and a period of rest sufficient in length to permit the circulation of air throughout the bed. At the beginning of the operation of a new or a recently cleaned bed the distribution of sewage over it will not be very uniform, since the greater proportion of it will seep through the sand near the distributors. As this area becomes partially clogged, more and more sewage will seek the distant points and the uniformity of distribution will be increased. The permissible rate of filtration consistent with good results varies with the character of sewage applied, but on the average it ranges from 10,000 to about 50,000 gallons per acre daily. Filters of this type will successfully treat either raw or settled sewage, though they will require more frequent cleaning in the former case.

From the standpoint of the character of effluent produced, intermittent sand filters are by far the most efficient of the three types which have been considered. When they are performing at their best they produce an effluent which is clear, practically odorless, almost entirely free from suspended matter, and very stable. They also remove a very high percentage of bacteria from the applied sewage. Since, however, a minimum of (roughly) forty times as much area of this type of filter as of trickling filters is required to treat similar amounts of sewage, the relative economy of the intermittent sand filter is very low as compared with the latter type, excepting where land is cheap and large deposits of suitable sand are available at the immediate site of the works. For this reason its use has been confined to comparatively small local areas in the United States.

Full descriptions of this type of filter are given by Metcalf and Eddy and by Fuller in general references numbered 25 (pp. 231–236 and Ch. XVI) and 24 (Ch. XIX), respectively, in the bibliography of the present section.

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DISINFECTION.

Disinfection in the treatment of sewage removes from the sewage the disease-producing organisms which may be present. For this

reason it is generally used in connection with other methods of treatment and as the final process before discharge of the sewage into the receiving body of water.

While proper disinfection of sewage will remove the greater part of the putrefying organisms there are generally a sufficient number of such organisms present in the receiving body of water to again start putrefying action in the organic matter; hence nuisance is not abated by the use of disinfection alone.

As a rule disinfection of sewage and sewage effluents has been adopted only where protection of water supplies, of shellfish beds, and bathing beaches during bathing season has been required.

As at present practiced disinfection consists in dosing or treating the sewage or sewage effluent with calcium hypochlorite or liquid chlorine. At the present time the liquid chlorine is rapidly replacing the hypochlorite.

In operation the hypochlorite or chlorine in solution, or the chlorine as a dry gas, is added to the sewage or sewage effluent, after which a short period of detention is allowed, in order that proper absorption of the chemical may take place.

At present the tendency appears to be more toward the purification and disinfection of water supplies than toward the disinfection of sewage and sewage effluents in order to protect the water supplies.

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3. Copper Sulphate and Chlorine Experiments in Ohio: Engineering Record, vol. 56, p. 547, 1907.
4. Sewage Disposal Problem of New Haven.—Report of Commission, pp. 40, 66–70, 1918.

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Sewage Disposal. Kinnicutt, Winslow, and Pratt.
Sewage Disposal. George W. Fuller. Pp. 726–731.
American Sewerage Practice, Vol. III, Sewage Disposal, pp. 737–782.

BROAD IRRIGATION.

The disposal of sewage upon the land dates back to the development of sewerage itself. The development of broad irrigation began in England in 1858, following the report of the Sewage of Towns Commission, and for a number of years was used extensively in Europe and to some extent in the United States. The method, as its name implies, is the irrigating of cultivated land with sewage.

For the purpose of operation of this method of disposal large areas of light sandy soil are required. On account of the inability

to properly handle the sewage upon areas of more dense or heavier soils, this method has been largely replaced by more modern methods, except in arid regions and in regions where large areas of otherwise waste sandy soil exist.

In general the area necessary will vary according to the character of soil; the rates range from 3,000 to 10,000 gallons per acre per day.

In so far as American practice is concerned, this method of disposal is but little practiced and is on the decline.

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(The above three books give numerous references on the subject.)

ACTIVATED SLUDGE.

During the past five years a new method of sewage disposal has been developed which gives great promise of success—the activated sludge method. This method is beyond the experimental stage at present, excepting the methods of handling and disposing of the sludge. At the present time a few plants have been constructed and several are contemplated.

Theory.—Aeration of sewage with finely divided air causes the suspended and colloidal matter in the sewage to gather, forming a flocculent precipitate in which large numbers of bacteria are accumulated. Conditions in the flocculus thus formed and in the presence of air appear to be very favorable for the multiplication of nitrifying organisms. Sludge thus formed and "seeded" with nitrifying bacteria is known as "Activated Sludge." When such activated sludge is added to fresh sewage and the whole aerated for short periods with finely divided air, a nitrification of the sewage, a high removal of bacteria, and a quick-settling sludge formation takes place. The effluent from plants of this type shows a bacterial reduction of over 90 per cent, and is clear and stable.

The sludge formed contains approximately 98 per cent water, and is therefore voluminous. The proper handling and disposing of the large amount of putrescible sludge has constituted one of the objections to this type of plant.

Outline of plant.—A plant of the activated sludge type consists in general of continuous flow sewage aerating tanks, settling tanks, sludge aerating tanks, sludge disposal apparatus, and the mechanical equipment for pumping, compressing air, etc.

Process.—The process is in general as follows: Approximately 20 to 25 per cent of well-activated sludge is added to the raw sewage as it enters the aerating tank. As the sewage with its added activated

sludge passes through the tank it is constantly aerated by air fed through diffusers in the tank bottom. From the aerating tank the mixed sewage and sludge pass to the settling tank in which the sludge settles rapidly, the supernatant matter passing off through the effluent outlet.

From the settling tank a portion of the sludge is drawn off to the sludge aerating tanks and further aerated to prepare it for addition to the incoming fresh sewage. The sludge accumulations in the settling tank are drawn off for dewatering and disposition.

Advantages and disadvantages.—The advantages of this type of treatment are the small area required and the reduced cost of construction.

The disadvantage at present is the question of sludge disposal.

General.—Following rather exhaustive experiments, the city of Milwaukee, Wis., has adopted the activated sludge process of sewage treatment, and has constructed one large unit which is being operated as an experimental unit.

Description of the experiments, the construction, etc., will be found in the second, third, fourth, and fifth annual reports of the Sewerage Commission of the City of Milwaukee, Wis., and in articles published in various engineering publications listed hereinafter.

A plant of the activated type has been recommended for the treatment of the sewage and packing-house wastes of Packingtown, the stockyard, and packing-house district of Chicago.

Several small plants have been constructed, the largest of which is at Houston, Tex. Reference to these plants and to experiments will be found in the bibliography.

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MILES ACID PROCESS.

The Miles acid method of sewage treatment, a patented process, while not yet used at any full-sized plant, seems from various experimental plants to possess considerable merit. The patent claims that the process "(1) Consists in introducing an inorganic acid as the sole effective agent," and "(3) Consists in introducing sulphurous acid into the sewage." Mr. R. S. Weston, one of the experimenters with this method of sewage treatment, explains the method as follows: "The Miles process attempts, by the addition of an acid, to precipitate the bulk of the solids from sewage in the form of a sludge which can be dried and degreased, thereby producing a readily salable and greaseless fertilizer, as well as recovering valuable grease. Either sulphuric or sulphurous acid may be used, and the process contemplates the manufacture of the acid at the disposal works."

Acid is usually added in the form of sulphur dioxide, generated by roasting pyrites, to a part of the sewage by means of an absorption tower and this overtreated part mixed with the entire sewage flow. An acidity of 50 parts per million as calcium carbonate has been found to be sufficient. After acidification the sewage contains bisulphites and some free sulphurous acid, also lime and magnesium soaps, which are attacked by the acid, liberating the free fatty acids. While passing through the sedimentation tanks part of the bisulphites and sulphurous acid are oxidized to bisulphates and sulphuric acid. A sedimentation period of four hours is allowed to the acidified sewage, after which the effluent is drawn off and the sludge dried and degreased by means of ether.

Claims for the process are an effluent almost sterile, stable and clear, and a sludge from which by-products such as grease and fertilizer will eliminate the costs of treatment. Experimental plants have been operated at Boston, Mass., by R. S. Weston, and at New Haven, Conn., by C.-E. A. Winslow, the results of which have been published. Some difficulty seems to have been encountered in se-

curing a salable grease, though the sludge was at all times stable and a high percentage removal of bacteria was effected in the effluent. The effluent seems to have a serious deoxygenating effect on the diluting water into which it is discharged, which may necessitate aeration of the effluent before discharge. Owing to the acid nature of the effluent considerable destructive effects on aquatic life existing in the diluting water may also take place.

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ELECTROLYTIC PROCESS.

The electrolytic process of sewage treatment consists of passing sewage through an electrolytic cell having iron plates, the sewage being untreated or treated with lime before entering the cell.

The action of the cell is to hasten precipitation of the solids in the sewage and to disinfect the sewage through the formation of hypochlorite.

The electrolytic method of treatment may be used simply as a disinfection process, in which case it follows other more or less complete treatment processes. Where the lime electrolytic method is used, the cell is preceded by fine screens and followed by sedimentation tanks and sludge handling apparatus.

Prior to 1914 such experiments as were made and such plants as were installed depended upon the electrolytic action alone, no chemicals being added to the sewage. A brief history of the electrolytic treatment is covered in "Sewage Disposal," by George W. Fuller, pages 550 to 576.

As far as known, but two plants of any size have been installed using the electrolytic type of treatment alone; one is at Santa Monica, Calif., and the other at Oklahoma City, Okla. Neither of these plants can be considered as complete sewage disposal plants. Description of them will be found in *Engineering* and *Contracting*, April 19, 1911, *Municipal Journal* and *Engineer*, February 8, 1912, and the *Engineering News*, March 21, 1912. The last-mentioned journal also has a comprehensive review of the whole subject of electrolytic treatment up to the date given.

In order that nuisance may be avoided in the body of water into which the sewage is ultimately discharged the plain electrolytic method of treatment will require a plant comprising grit chambers, fine screens or preliminary tanks, electrolytic cells, and possibly sludge-disposal apparatus. A small plant having Imhoff tanks preceding the electrolytic apparatus is in operation at Durant, Okla. The description, with results of tests made at this plant, will be found in the *Engineering News*, volume 76, page 547.

In the past few years experiments have been carried on with the lime-electrolytic method of sewage treatment. This process, patented by C. P. Landreth, of Philadelphia, Pa., consists of first adding lime to the sewage, after which it is passed through the electrolytic cell.

So far as is known no municipal plants or plants of any size are in operation or contemplated.

In 1914 an experimental and demonstration plant was installed at Elmhurst, Borough of Queens, Brooklyn, N. Y.; in 1916 one at Decatur, Ill.; and in 1918 one at Easton, Pa.

Descriptions and comments upon the first-named plant will be found in the *Engineering Record*, volume 70, pages 285, 299, 315, 429, and 430. Other articles covering the operation of this plant will be found in *Metallurgical* and *Chemical Engineering*, volume 13, Nos. 12 and 13, October 15 and November 1, 1915; in the *Canadian Engineer*, November 5, 1914; and the *Municipal Journal*, November 5, 1914.

Attention is also called to a report on sewage disposal at Lexington, Ky., by Surg. W. H. Frost and Sanitary Engineer R. E. Tarbett, of the United States Public Health Service, dated January 13, 1916, and to a report by Prof. E. B. Phelps, of the Hygienic Laboratory, United States Public Health Service, upon the electrolytic method. Both of these reports are on file at the Bureau of the Public Health Service. References to the Decatur, Ill., plant will be found in the *Municipal Engineer*, February 18, 1918, and the *Engineering News-Record*, volume 74, November 11, 1916, pages 575 and 596. The last-named reference is an abstract of a report by Edward Bartow,

director of the Illinois State Water Survey, on comparative tests of the lime-electrolytic process and of lime treatment alone. According to this report, the results would indicate that the lime-electrolytic treatment is little better than lime treatment alone. Unfortunately the tests were of rather short duration, as the company controlling the patents, objecting to comparative tests, dismantled the plant.

An abstract of the report on tests made at the Easton, Pa., plant by the Engineering Division of the Pennsylvania State Department of Health and by a committee of the Franklin Institute will be found in the *Engineering News-Record*, volume 83, September 18, 1919, pages 569–573. A complete report of the committee from the Franklin Institute is published in the *Journal of the Franklin Institute* for August, 1919.

The plant layout, which was more or less similar in each of the three installations, was as follows:

1. Coarse bar screens followed by fine screens.
2. Pumping equipment for lifting sewage and furnishing a sufficient operating head.
3. Lime-mixing tanks.
4. Mixing chambers or channels for mixing the lime solution with the sewage.
5. Electrolytic cells.
6. Final sedimentation tank, with a sedimentation period of 4½ hours.
7. Sludge-disposal apparatus.

The effluent obtained from the Landreth "Lime-Electrolytic" or "Direct-Oxidation" method of treatment, judging by the results published, is very satisfactory. The operating costs are, however, far in excess of the cost necessary to obtain effluents of comparable quality by means of methods now in general use.

The sludge formed appears to be comparable with the sludge from the chemical precipitation method, both as to quantity and characteristics. The recommendations of the patentee are, apparently, that this sludge be handled by filter pressing, as is the sludge from the chemical precipitation plants where lime is used.

Present Status.

Plain electrolytic treatment.

Judging from such tests as have been made of the electrolytic treatment for the sterilization of sewage, operation is erratic and results show great variations.

The costs of operation are greater and results less reliable than is the case when calcium hypochlorite or liquid chlorine is used for disinfection.

Lime-electrolytic or direct-oxidation method.

The process is in the experimental stage.

The cost of operation is excessive.

The practicability of the process has not as yet been recognized by the engineering profession.

Conclusions.

In its present status any installation of the lime-electrolytic or direct-oxidation method on a large scale should be preceded by the installation of a test unit. This unit should be operated for a period sufficiently long to insure any inherent mechanical defects in the apparatus and to demonstrate its ability to maintain a uniform efficiency.

In view of the fact that equally good results are claimed with the use of lime alone, comparative tests should be carried on simultaneously in order to prove or disprove this contention.

All tests should be under the direction of disinterested parties, but in cooperation with the patentee or his representative.

References.

IN CURRENT ENGINEERING LITERATURE.

1. Description of the Electrolytic Sewage Plants at Santa Monica, Calif., and Oklahoma City, Okla.: Engineering and Contracting, April 19, 1911.
2. Same as (1) above: Municipal Journal and Engineer, February 8, 1912.
3. Comprehensive Review of the Electrolytic Treatment prior to 1912; Engineering News, March 12, 1912.
4. Electrolytic Treatment of Sewage at Oklahoma City: Engineering Record, vol. 66, p. 55.
5. Description and Abstract of Tests of an Imhoff Tank-Electrolytic Plant at Durant, Okla.: Engineering News, September 21, 1916, p. 547.
6. Second Annual Report of the Sewerage Commission of City of Milwaukee, 1915, pp. 69 and 106–108.
7. Report on Electrolytic Treatment (Elmhurst Plant). P. M. Travis. Comments by C. P. Landreth and E. B. Phelps: Engineering Record, vol. 70, pp. 285, 299, 315, 429, 430.
8. Electrolytic treatment of sewage—Information from a report by Elmer W. Futh upon the operation and results obtained at Elmhurst (N. Y.) disposal plant by the method patented by C. P. Landreth. Canadian Engineer, November 5, 1914.
9. Electrolytic Sewage Treatment Tests in a Plant Treating 750,000 gallons per day: Municipal Journal, November 5, 1914.
10. Description of the Lime-Electrolytic Method of Sewage Disposal: Metallurgical and Chemical Engineering, vol. 13, October 15 and November 1, 1915.
11. Treatment of Sewage with Electricity and Lime: Municipal Engineer, December, 1915.
12. Tests on the Decatur Plant. Edward Bartow. Engineering Record, vol. 74, pp. 575 and 596. (Finds electrolytic treatment of sewage little better than treatment with lime alone.)

13. The Electro-Chemical Sewage Treatment Process as Operated at Decatur, Ill.: Municipal Engineer, February, 1918.
14. Sewage Treatment at Easton, Pa.—Details and methods of operation of plant of 1,000,000 gallons capacity by "direct-oxidation type": Municipal Journal, November 16, 1918.
15. Abstracts of reports by the Pennsylvania State department of health and a committee from the Franklin Institute on tests of the direct-oxidation (electrolytic) plant at Easton, Pa.: Engineering News-Record, September 18, 1919, pp. 569–573.
16. Report of committee appointed to investigate the direct-oxidation method of sewage disposal as demonstrated at the Easton (Pa.) plant (not the exact title): Journal of the Franklin Institute, August, 1919.

GENERAL REFERENCE.

17. Sewage Disposal. George W. Fuller. Pp. 550–576.
18. American Sewerage Practice, Vol. III, Sewage Disposal, p. 738. Metcalf and Eddy.

CONCLUSIONS.

In the preceding chapters relating to current practice of sewage disposal in this country, an attempt has been made to give the essential features concerning each process used in designing purification plants. The particular combination of these processes to be used by an individual city will depend upon local conditions. It is quite apparent that a city, even though it be very large, located on a large river or other large body of water, would not find it necessary to purify its sewage to the same extent that a smaller city would, located on a small stream. In some places the body of water receiving sewage has sufficient diluting capacity to digest the organic matter without causing a nuisance, while in other cases fine screens will be required to remove from the sewage, material which floats and causes objectionable drifts. At the other extreme there are a large number of cities located on small rivers where the minimum flow in summer time is very low, and it is necessary to design treatment plants producing effluents which are thoroughly oxidized and will not draw upon the oxygen of the receiving body of water.

Current practice, therefore, includes one of the processes or any combination of them, described under the various chapter headings, depending upon the local conditions governing at each city. To obtain a comprehensive understanding of sewage disposal in this country, it is suggested that the engineering magazines, reports, and books on sewage disposal referred to in this report, and not inclosed, be secured. Practically all of them can be obtained by writing to the authors or publishers.

The more recent books published on sewage disposal have been referred to by title and author and the name of the publication given. The titles of some of the magazines interested in sewage disposal have, however, been changed in recent years, and some of them may

be confusing as they have appeared in the references. The correct titles and the publishers are given below.

The *Engineering Record* and the *Engineering News* were formerly separate journals, but they have been combined and are now published under the name of the *Engineering News-Record* by the McGraw-Hill Publishing Co., of New York City.

The *Municipal Journal* is now the *Municipal Journal and Public Works* and is published by the *Municipal Journal and Engineer*, at New York City.

Articles appearing in *Engineering and Contracting* are published in the "Waterworks and Hydraulics" issues, which are printed twice each month. This journal is published at 608 South Dearborn Street, Chicago, Ill.

APPENDIX.

A PARTIAL LIST OF PUBLISHED REPORTS ON SEWAGE DISPOSAL IN THE UNITED STATES.

1. Reports relating to sewage disposal for New York City and Brooklyn:
   - (*a*) Report of Metropolitan Sewerage Commission of New York City, August 30, 1914.
   - (*b*) Report on the Main Drainage and Sewage Disposal of the Area Tributary to Jamaica Bay, April 23, 1917.
   - (*c*) Report of Engineers on the Electro-Chemico Corporation Process of Sewage Purification as Operated at the Elmhurst Disposal Plant.
   - (*d*) Article on Sewage and Dissolved Oxygen in New York Harbor, by Kenneth Allen, Engineering News-Record, July 31, 1919.
2. Reports relating to sewage disposal for the Sanitary District of Chicago:
   - (*a*) Report of streams examination, chemic and biologic, of the waters between Lake Michigan at Chicago and the Mississippi River at St. Louis. Sanitary status of Drainage Canal in 1902.
   - (*b*) Report on the Disposal of Sewage from the Calumet Subdivision of the Sanitary District of Chicago. 1907.
   - (*c*) Engineering Data, the Sanitary District of Chicago. 1910.
   - (*d*) Report on Sewage Disposal. 1911.
   - (*e*) Sewerage System of Chicago, also Review of Sewage Disposal in the United States and Abroad. 1911.
   - (*f*) The Diversion of the Waters of the Great Lakes by Way of the Sanitary and Ship Canal of Chicago. 1913.
   - (*g*) Water Power Development—Report by Commission on Sewage Disposal and Water Power Development.
   - (*h*) Report on Pollution of Des Plaines River and Remedies Therefor by the Sanitary District of Chicago. 1914.
   - (*i*) The Electric Department of the Sanitary District of Chicago. Power Developed from Drainage Canal. 1916.
   - (*j*) The Laws of and in Reference to the Sanitary District of Chicago, with Annotations. 1916.
   - (*k*) Report of Existing Lake Levels of Lake Michigan. 1917.
   - (*l*) Experimental Engineering; Particular Reference to the Construction of Testing Stations on Water and Sewage Problems. 1917.
   - (*m*) The Activated Sludge Process for Handling Packingtown Trade Wastes. 1917.
   - (*n*) History and Growth of the Sanitary District of Chicago. 1919.

(*o*) Memorial: Data on the Drainage Canal.
(*p*) Maps Showing Territory Sewered by the Sanitary District of Chicago.
(*q*) Miscellaneous reports on sewage disposal by Langdon Pearse, sanitary engineer for the Sanitary District of Chicago.

3. Reports relating to sewage disposal for Cleveland, Ohio:
(*a*) Report on Tests at Sewage Testing Station. 1914.
(*b*) Reprint from Engineering News on results of activated sludge treatment. 1916.

4. Reports relating to sewage disposal at Providence, R. I.:
(*a*) Annual Report of City Engineer, 1918.
(*b*) Plans and Photographs of Disposal Plant (with a description of the plant attached).

5. Brief Description of Sewage Disposal Plants at Atlanta, Ga. 1919.
6. Report of Sewage Testing Station at Akron, Ohio. 1912.
7. Report of Passaic Valley Sewerage Commission, 1916.
8. Report on Sewage Disposal and the Sewage Experiment Station, Gloversville, N. Y. 1908.
9. Report on Sewage Disposal System of Rochester, N. Y. 1913.
10. Reports relating to sewage disposal at Columbus, Ohio:
(*a*) Annual Report, 1913.
(*b*) Annual Report, 1914.
(*c*) Annual Report, 1915.
(*d*) Annual Report, 1916.
(*e*) Annual Report, 1917.
(*f*) Annual Report, 1918.

11. Reports relating to sewage disposal at Milwaukee, Wis.

RURAL PLUMBING.[1]

By GEO. C. WHIPPLE, Professor of Sanitary Engineering in Harvard University, Cambridge, Mass.

The nation-wide movement in favor of better rural living conditions offers opportunities for important extensions of the plumbing business. The movement is found in different stages in different parts of the country, but everywhere it is a progressive movement.

Sanitation is one of its important elements. There are large areas, chiefly in the South, where privies are being constructed for the first time; there are districts where open, surface privies are being replaced by indoor chemical closets, and there are places where indoor water-closets are being installed. The sale of concrete tanks is increasing rapidly, a single factory in a southern city shipping over 2,000 annually.

In its first stages this movement for better sanitation is primarily in the interest of health; in its later stages it is in the interest of both health and comfort.

Plumbers are not interesting themselves as they should in the privy problem, perhaps for the reason that there is no piping and few fixtures to be installed, and they do not see that it has a fundamental relation to their business. Plumbers are naturally called

[1] This article originally appeared in The Plumbers' Trade Journal, Steam and Hot Water Fitters' Review, New York, issue of Oct. 25, 1919, and is reprinted here by permission.

upon to install water-closets in country houses, where these are demanded, but even then they do not give sufficient attention to the most important part of the problem, namely, that of disposal, for the reason that they have never studied it.

In cities the sewer is usually at hand, the plumber looks after the inside work, the drain layer makes the sewer connections, and the city sewer department takes up the burden of final disposal, the house owner being relieved of this responsibility.

When the plumber transfers his work to the country he is apt to follow his city-bred methods. The sewage is led to a cesspool or perhaps to some specially devised tank, leaving the burden of looking after the ultimate disposal of the accumulated filth on the house owner.

It is true that nature does wonders in destroying offensive organic matter, but for the best results the forces of nature need to be guided and utilized to their best advantage. The plumber is not helping to solve this problem, but is leaving it to health officials who do not always have the requisite understanding of the mechanical aspects of the problem. If the plumber does not take a hand in solving this problem, methods of disposal are likely to be devised which do not require plumbing.

The Sewage Disposal Problems.

The plumber does not realize that when he installs rural water-closets without giving adequate attention to the final disposal of the sewage he is catering to comfort but is not safeguarding health. He is very apt to begin his design at the wrong end, to consider fixtures first, arrange the pipes so as to bring all wastes together, and, lastly, to think of disposal. The rural plumber of the future will turn this around and think first of disposal and lastly of fixtures and pipes, considering the problem as a united whole. When something more than a cesspool is planned for a single house it is customary to copy the methods used by municipalities and build these on a small scale. This is illogical and often leads to bad results.

City sewage works require constant attention, and no rural house owner wants to take that burden; he wants to be relieved of it. No system will operate without some attention—advertising circulars to the contrary—but the less work required of the house owner the better he will like it. The treatment of grease will illustrate the difference between city and rural plumbing problems.

Grease is one of the most troublesome substances to get rid of. In cities it necessarily goes to the sewer along with fecal matter and other wastes. Mixed with fecal matter it clogs filters, interferes with septic processes, and increases operating expenses. The large quantities of grease from the kitchens of the Army cantonments

was one of the most troublesome aspects of the sewage disposal problems during the war. In the absence of indoor water-closets and sewers it has long been customary to allow sink wastes to be carried out upon the ground near the house and to dispose of fecal matter by the privy method. Even with cesspools this separation has sometimes been made with good results.

But the policy of "everything to the sewer," while it may work well where there is a sewerage system, does not work well where the house sewer terminates on the premises. The reason is that when grease and fecal matter are mixed together the natural processes of destruction do not go on well. If the house sewer terminates in a leaching cesspool and if sink wastes and water-closets both discharge into it the grease clogs up the pores of the ground and prevents percolation, while it also interferes with bacterial action, making necessary the frequent removal of offensive sludge. Cesspools which receive fecal matter only, often run for many years without cleaning, and during this time septic action greatly reduces the amount of sludge. In septic tanks, as well as cesspools, grease interferes with the process.

In imitation of city methods elaborate sewage disposal plants have been built on many a private estate with the house sewer terminating in a septic tank or in somebody's "system," and owners have been told that these systems would need no attention and would create no nuisance. A large proportion of such plants have been dismal failures, causing more trouble than the cesspools which they replaced. This trouble might have been avoided in a great measure by following the simple principle of keeping grease and fecal matter apart.

Fecal matter readily succumbs to decomposition by the anaerobic or septic process. Grease and soaps are best destroyed by exposure to the air. Separate disposal of these wastes means two systems instead of one, but though more pipes may be needed the advantages far outweigh the extra first cost, while the reduced cost of cleaning tends to even up the financial score in the course of a few years.

Practices to be Observed in Country Work.

There is another important principle to follow in designing plumbing systems for rural conditions. As the water has to be disposed of on the premises and as the water supply of the house may be obtained from a well also located on the premises, it is important that fixtures be designed to use as little water as possible. It is well to use a type of closet which will flush with a small amount of water, to use wash-basins of small size, to use shower baths instead of tubs, and to do all that is possible to reduce water consumption.

Again, the whole question of trapping and venting needs modification for the small country house. Houses which are occupied during

the summer only need plumbing systems which can be easily drained and made safe against freezing and corrosion during the winter, and so arranged that this work can be done by the owner himself. Getting ready for winter should be regarded as normal operation and not as repairs, and the master plumber should not be expected to be called on for this job.

There are, in fact, many rural plumbing problems which require careful study, problems of water supply, of pumping, of storage, of fixtures, of disposal. They must be solved along the lines of cheapness, simplicity, and ease of operation, but always keeping in mind the protection of the health of the household.

Imitation of city methods or practices will not do. The rural dweller does right to balk at them. And yet the family on the farm and in the small village ought to have as good sanitation as the family in the city. If the plumbers are willing to expand their field and to cooperate with local boards of health, they can do much to restore our decadent rural life with profit to themselves and with benefit to the Nation.

EDITORIAL NOTE.—In connection with the above article on Rural Plumbing, reference is made to the fact that the United States Public Health Service during the past three years has made an investigation relating to the treatment and disposal of sewage from small communities or isolated houses which are provided with community or private systems of water supply and with modern plumbing, but which do not have sewers or other adequate means for the proper disposal of sewage.

This experimental investigation has been carried out by Associate Sanitary Engineer Leslie C. Frank and Assistant Sanitary Engineer C. P. Rhynus, under the supervision of Senior Sanitary Engineer Earle B. Phelps. An extensive report embodying the complete results of the investigation is given in Public Health Bulletin No. 101. A preliminary paper, in which the investigation is briefly described, was published in the Public Health Reports, February 14, 1919.

Where it is necessary only to remove the settling and floating solids the Imhoff tank is recommended. Where it is necessary to produce an oxidized effluent the "preliminary Imhoff tank, lath trickling filter, final Imhoff tank combination" is, in general, most advantageous from the standpoints of area of land and attention required. From the standpoints of fall required and initial cost of construction, the subsurface irrigation method may in some cases offer advantages. It depends wholly upon the drainage and oxidizing capacity of the soil, however, and can not be recommended in general under all kinds of soil conditions. The lath trickling filter, on the other hand, is a device capable of exact reproduction anywhere, and to that extent may be confidently recommended for general use, regardless of soil and other conditions.

Several complete designs, involving preliminary and final Imhoff tanks together with trickling filter, have been worked out for populations of from 6 to 120 people. The degree of purification effected is sufficient for all purposes, except where the discharge is directly into a water supply. In such a case chemical disinfection of the effluent

is recommended in addition. The plant will operate without nuisance and, with a monthly inspection and semiannual or annual removal of sludge from the tanks, will operate continuously without further attention.

DEATHS DURING WEEK ENDED JAN. 3, 1920.

From the "Weekly Health Index," Jan. 6, 1920, issued by the Bureau of the Census, Department of Commerce.

Deaths from all causes in certain large cities of the United States during the week ended Jan. 3, 1920, infant mortality (per cent), annual death rates, and comparison with corresponding week of preceding years.

City.	Population July 1, 1918, estimated.	Week ended Jan. 3, 1920.		Average annual death rate per 1,000.[2]	Per cent of deaths under 1 year.	
		Total deaths.	Death rate.[1]		Week ended Jan. 3, 1920.	Previous year or years.[2]
Albany, N. Y.	112,565	43	19.9	C 17.6	4.7	C 10.5
Atlanta, Ga.	201,732	57	14.7	C 17.3	14.0	C 14.9
Baltimore, Md.	[3] 669,981	229	17.8	A 19.5	15.7	A 13.8
Birmingham, Ala.	197,670	57	15.0	A 15.8	12.3	A 15.2
Boston, Mass.	785,245	253	16.8	A 21.3	15.4	A 14.5
Buffalo, N. Y.	473,229	131	14.4	C 15.6	16.8	C 19.7
Cambridge, Mass.	111,432	19	8.9	A 10.3	10.5	A 9.3
Chicago, Ill.	2,596,681	715	14.4	A 17.8	14.7	A 16.0
Cincinnati, Ohio	418,022	129	16.1	C 19.2	9.3	C 11.7
Columbus, Ohio	225,296	73	16.9	C 20.4	5.5	C 14.8
Dayton, Ohio	130,655	36	14.4	C 20.4	27.8	C 11.8
Denver, Colo.		75			14.7	
Fall River, Mass.	128,392	29	11.8	C 13.8	41.4	C 5.9
Grand Rapids, Mich.	135,450	29	11.2	C 14.2	20.7	C 10.8
Indianapolis, Ind.	290,389	92	16.5	C 17.8	5.4	C 13.1
Jersey City, N. J.	318,770	80	13.1	C 14.1	15.0	C 16.3
Kansas City, Mo.	313,785	98	16.3	C 18.4	8.2	C 5.4
Los Angeles, Calif.	568,495	184	16.9	A 15.1	7.1	A 9.3
Louisville, Ky.	242,707	67	14.4	C 16.8	7.5	C 6.4
Lowell, Mass.	109,081	31	14.8	A 18.3	19.4	A 16.8
Memphis, Tenn.	154,759	73	24.6	C 22.9	6.8	C 8.8
Milwaukee, Wis.	453,481	101	11.6	A 13.5	16.8	A 18.8
Minneapolis, Minn.	383,442	84	11.4	C 11.3	9.5	C 15.7
Nashville, Tenn.	119,215	44	19.2	C 16.6	13.6	C 7.9
Newark, N. J.	428,684	116	14.1	C 17.4	12.9	C 13.3
New Haven, Conn.	154,865	40	13.5	C 19.5	10.0	C 10.3
New Orleans, La.	382,273	138	18.8	A 22.8	13.8	A 13.2
New York, N. Y.	5,215,879	1,401	14.0	C 16.8	12.6	C 14.3
Oakland, Calif.	214,206	51	12.4	A 13.8	9.8	A 10.7
Omaha, Nebr.	180,264	47	13.6	C 11.9	27.7	C 7.3
Philadelphia, Pa.	1,761,371	526	15.6	[4] 16.7	16.0	[4] 14.2
Pittsburgh, Pa.	593,303	182	16.0	C 22.1	14.3	C 14.7
Portland, Oreg.		69			2.9	C 5.1
Providence, R. I.	263,613	61	12.1	C 15.6	16.4	C 6.3
Richmond, Va.	160,719	48	15.6	C 19.1	6.2	C 10.2
Rochester, N. Y.	264,856	65	12.8	C 9.8	10.8	C 12.0
St. Louis, Mo.	779,951	210	14.0	C 15.3	10.0	C 8.7
St. Paul, Minn.	257,699	48	9.7	C 10.9	12.5	C 18.5
San Francisco, Calif.	478,530	151	16.5	C 14.3	7.3	C 6.9
Seattle, Wash.		71			9.9	A 11.3
Spokane, Wash.		14			64.3	C 5.6
Syracuse, N. Y.	161,404	41	13.2	C 15.2	24.4	C 10.6
Toledo, Ohio.	262,234	66	13.1	A 13.9	19.7	A 15.2
Washington, D. C.	401,681	148	19.2	A 17.3	12.2	A 9.8
Worcester, Mass.	173,650	38	11.4	C 19.2	15.8	C 10.9

[1] Annual rates per 1,000 estimated population.
[2] "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1917.
[3] Population estimated as of July 1, 1919.
[4] Data are based on statistics of 1915, 1916, and 1917.

Summary of information received by telegraph from industrial insurance companies for week ended Jan. 3, 1920.

Policies in force	42,319,748
Number of death claims	7,954
Death claims per 1,000 policies in force, annual rate	9.8

PREVALENCE OF DISEASE.

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

UNITED STATES.

CURRENT STATE SUMMARIES.

Telegraphic Reports for Week Ended Jan. 10, 1920.

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

ALABAMA.

No unusual prevalence.

ARKANSAS.	Cases.
Chicken pox	57
Diphtheria	37
Gonorrhea	36
Hookworm	1
Influenza	35
Malaria	172
Measles	6
Ophthalmia neonatorum	1
Pellagra	2
Scarlet fever	27
Smallpox	15
Syphilis	16
Trachoma	10
Tuberculosis	24
Typhoid fever	19
Whooping cough	21

CALIFORNIA.	
Influenza	24
Lethargic encephalitis:	
San Francisco	2
Santa Rosa	1
Smallpox:	
Alameda	7
Butte County	4
Los Angeles	4
Napa	12
Pinole	4
Riverside	8
San Francisco	5
Solano County	4
Scattering	18

CONNECTICUT.	Cases.
Chicken pox	98
Diphtheria:	
Fairfield County—	
Bridgeport	22
Stamford	4
Hartford County—	
Hartford	7
New Haven County—	
Meriden	5
New Haven	18
Waterbury	5
New London County—	
Norwich	5
Scattering	25
Erysipelas	2
Favus	4
Gonorrhea	13
Influenza	1
Measles:	
Fairfield County—	
Bridgeport	53
New Canaan	8
Stamford	18
Stratford	5
Hartford County—	
Enfield	11
Litchfield County—	
Winchester	12
New Haven County—	
East Haven	25
Hamden	14
Middlebury	5
Milford	12
New Haven	88
Waterbury	6

CONNECTICUT—continued.

	Cases.
Measles—Continued.	
New London County—	
Jewett City	8
Norwich	14
Windham County—	
Plainfield	10
Sterling	12
Scattering	30
Measles (German)	1
Mumps	35
Pneumonia	6
Scarlet fever:	
Fairfield County—	
Bridgeport	4
Hartford County—	
Bristol	4
Hartford	20
New Britain	5
New Haven County—	
New Haven	9
Waterbury	14
Scattering	30
Septic sore throat	1
Syphilis	41
Tuberculosis	28
Typhoid fever	3
Whooping cough	75

DELAWARE.

Chicken pox	7
Diphtheria	6
Influenza	1
Measles	51
Mumps	4
Pneumonia	7
Scarlet fever:	
Georgetown	3
Wilmington	4
Smallpox	2
Tuberculosis	1
Typhoid fever	1
Whooping cough	2

FLORIDA.

Diphtheria	26
Influenza	2
Malaria	22
Pneumonia	7
Scarlet fever	5
Smallpox	146
Typhoid fever	9

GEORGIA.

Cerebrospinal meningitis	1
Chicken pox	8
Conjunctivitis (infectious)	2
Diphtheria	17
Dysentery (amebic)	1
Dysentery (bacillary)	1
Gonorrhea	68
Hookworm	1
Influenza	27
Malaria	11
Measles	31
Measles (German)	1
Mumps	5

GEORGIA—continued.

	Cases.
Paratyphoid fever	1
Pneumonia (lobar)	16
Scarlet fever	23
Septic sore throat	8
Smallpox	17
Syphilis	12
Tuberculosis (pulmonary)	14
Tuberculosis (other forms)	1
Typhoid fever	6
Whooping cough	12

ILLINOIS.

Cerebrospinal meningitis:	
Chicago	1
Chancroid	24
Diphtheria:	
Belleville	5
Chicago	174
Granite City	5
Scattering	59
Gonorrhea	323
Influenza:	
Chicago	65
Scattering	8
Lethargic encephalitis:	
Chicago	5
Scarlet fever:	
Chicago	333
Decatur	4
Evanston	10
Macon County	7
Maywood	6
Oakford	4
Oakford Township	7
Oak Park	7
Rockford	6
Seymour	4
Symas Township	4
Will County—	
Plainfield Township	4
Woodstock	6
Scattering	81
Smallpox:	
Benton	5
Eldorado	6
Momence	12
Warren County—	
Swan Creek Township	7
Scattering	33
Syphilis	343
Typhoid fever	29

INDIANA.

Cerebrospinal meningitis:	
White County	1
Chancroid	7
Diphtheria:	
Dubois County	4
Lake County	6
Marion County	6
St. Joseph County	7
Wayne County	11
Scattering	24
Gonorrhea	118

INDIANA—continued.

	Cases.
Influenza:	
Dekalb County	5
Kosciusko County	5
Scattering	8
Measles:	
Bartholomew County	8
Dearborn County	12
Fayette County	7
Grant County	4
Hancock County	48
Jackson County	94
Jay County	26
Lagrange County	6
Marion County	15
Rush County	8
St. Joseph County	4
Wabash County	6
Warrick County	9
Wayne County	23
Scattering	17
Rabies in animals	2
Scarlet fever:	
Boone County	6
Carroll County	4
Decatur County	5
Elkhart County	16
Fountain County	4
Green County	4
Jasper County	4
Lagrange County	13
Lake County	7
Marion County	31
Rush County	21
St. Joseph County	25
Wabash County	5
Warrick County	4
Wayne County	8
Scattering	37
Smallpox:	
Fountain County	24
Grant County	4
Howard County	34
Jackson County	11
Lake County	7
Laporte County	5
Madison County	8
Marion County	22
Miami County	5
St. Joseph County	23
Sullivan County	10
Tippecanoe County	7
Warrick County	7
Scattering	17
Syphilis	103
Typhoid fever:	
Lake County	4
Parke County	4
Scattering	7

IOWA.

Cerebrospinal meningitis:	
Boone	1
Kilduff	2
Chancroid	1
Chicken pox	5

IOWA—continued.

	Cases.
Diphtheria:	
Des Moines	10
Scattering	16
Gonorrhea	48
Influenza:	
Des Moines	10
Measles:	
Garwin	1
Emmet County	4
Mason City	40
Mumps	10
Poliomyelitis—Keokuk	1
Scarlet fever:	
Des Moines	8
Palo Alto County	10
Pottawattamie County	4
Scattering	23
Smallpox:	
Carroll County	6
Cedar Falls	4
Davenport	22
Dickinson County	6
Greenfield	5
Mason City	13
Montour	7
Scattering	12
Syphilis	16

KANSAS.

Diphtheria	55
Influenza	17
Scarlet fever	144
Smallpox	77

LOUISIANA.

Cerebrospinal meningitis:	
Alexandria	2
Meridian	1
Robeline	1
Place not stated	1
Chancroid	11
Diphtheria	35
Gonorrhea	105
Influenza	52
Poliomyelitis	1
Scarlet fever	9
Smallpox	24
Syphilis	64
Typhoid fever	17

MAINE.

Chancroid	4
Chicken pox	17
Diphtheria:	
Bradford	4
Scattering	5
Gonorrhea	33
Influenza	1
Measles	2
Mumps	5
Scarlet fever:	
Paris	5
Portland	8
Sanford	4
Scattering	14

MAINE—continued.

	Cases.
Smallpox	8
Syphilis	9
Tuberculosis	12
Typhoid fever	7
Whooping cough	4

MASSACHUSETTS.

Cerebrospinal meningitis	6
Chickenpox	272
Conjunctivitis (suppurative)	7
Diphtheria	235
Gonorrhea	159
Influenza	40
Measles	868
Measles (German)	4
Mumps	236
Ophthalmia neonatorum	35
Pneumonia (lobar)	142
Scarlet fever	399
Septic sore throat	4
Syphilis	77
Trachoma	5
Tuberculosis (pulmonary)	141
Tuberculosis (other forms)	18
Typhoid fever	20
Whooping cough	269

MINNESOTA.

Cerebrospinal meningitis	3
Chancroid	5
Gonorrhea	68
Smallpox:	
Alexandria	13
Beardsley	4
Detroit	4
Rochester	4
St. Cloud	6
St. Louis County—	
Stunz Township	5
Staples	5
Steel County—	
Clinton Falls Township	6
Washington County—	
St. Paul Park	6
Scattering	30
Syphilis	45

MONTANA.

Diphtheria	1
Scarlet fever	36
Smallpox	31
Typhoid fever	1

NEBRASKA.

Chicken pox	6
Chancroid	6
Diphtheria:	
Omaha	8
Scattering	6
Gonorrhea	68
Influenza	2
Measles	3
Mumps	1
Scarlet fever:	
Omaha	28
Page	15
Scattering	18

NEBRASKA—continued

	Cases.
Septic sore throat	1
Smallpox:	
Ashland	11
Barada	6
Chambers	6
Elgin	20
Falls City	6
Jennings	5
Omaha	11
University Place	6
Verdon	4
York County	6
Scattering	36
Syphilis	50
Tuberculosis	2
Typhoid fever	1
Whooping cough	7

NEW JERSEY.

Influenza	23
Pneumonia	176

NEW MEXICO.

Chicken pox	22
Diphtheria	4
Gonorrhea	13
Influenza	8
Malaria	1
Measles	13
Mumps	10
Pneumonia	4
Septic sore throat	3
Scarlet fever	8
Smallpox:	
Hot Springs	6
Hillsboro	5
Scattering	12
Syphilis	4
Tuberculosis	15
Typhoid fever	2

NEW YORK.

(Exclusive of New York City.)

Cerebrospinal meningitis:	
Mount Kisco	1
Diphtheria	260
Gonorrhea	68
Influenza	31
Measles	763
Poliomyelitis—Oswego	1
Pneumonia	172
Scarlet fever	220
Smallpox:	
Buffalo	11
Scattering	3
Syphilis	163
Typhoid fever	16
Whooping cough	271

NORTH CAROLINA.

Cerebrospinal meningitis	3
Chancroid	14
Chicken pox	127
Diphtheria	59
Gonorrhea	94
Measles	40

NORTH CAROLINA—continued.

	Cases.
Measles (German)	1
Pneumonia (broncho)	30
Pneumonia (lobar)	37
Poliomyelitis	1
Scarlet fever	50
Septic sore throat	4
Smallpox	99
Syphilis	32
Trachoma	1
Typhoid fever	11
Whooping cough	48

OHIO.

Diphtheria:	
Cincinnati	19
Columbus	26
Kenmore	7
Scarlet fever:	
Akron	47
Cincinnati	46
Columbus	53
Portage County—	
Shalersville Township	9
Smallpox:	
Piqua	14

VERMONT.

Chicken pox	42
Diphtheria	6
Gonorrhea	11
Measles	81
Mumps	108
Scarlet fever	18
Syphilis	6
Typhoid fever	4
Whooping cough	85

VIRGINIA.

Smallpox:	
Amherst County	1
Bedford County	4
Henry County	1
Rockingham County—Several.	

WASHINGTON.

Chicken pox	114
Diphtheria	40
Measles	213

WASHINGTON—continued.

	Cases.
Mumps	49
Pneumonia	1
Scarlet fever	67
Smallpox	261
Tuberculosis	14
Typhoid fever	9
Whooping cough	67

WEST VIRGINIA.

Diphtheria:	
Fairmont	6
Martinsburg	4
Parkersburg	4
Scattering	9
Measles	2
Scarlet fever:	
Mannington	4
Morgantown	6
Scattering	13
Smallpox	7
Typhoid fever	5

WISCONSIN.

Milwaukee:	
Cerebrospinal meningitis	3
Chicken pox	50
Diphtheria	21
Erysipelas	4
Measles	63
Rubella	1
Scarlet fever	42
Smallpox	7
Tuberculosis	16
Typhoid fever	3
Whooping cough	28
Scattering:	
Cerebrospinal meningitis	3
Chicken pox	53
Diphtheria	29
Influenza	3
Measles	156
Poliomyelitis	2
Scarlet fever	99
Smallpox	156
Tuberculosis	12
Typhoid fever	3
Whooping cough	49

Kentucky Report for Week Ended Jan. 3, 1920.

Cerebrospinal meningitis:	Cases.
Carlisle County	1
Clinton County	1
Crittenden County	1
Chicken pox	35
Diphtheria:	
Greenup County	4
Jefferson County—	
Louisville	28
Kenton County	8
McCracken County—	
Paducah	4
Scattering	12
Gonorrhea	26
Influenza:	
Clark County	4
Lee County	7
Lyon County	4
Scattering	26
Measles:	
Bourbon County—	
Paris	4
Campbell County—	
Newport	6
Clark County	5
Graves County	12
Kenton County	8
Scott County	15
Washington County	14
Whitley County—	
Williamsburg	18
Scattering	18
Mumps	2

Influenza—Continued.

	Cases.
Paratyphoid fever	1
Pneumonia:	
Allen County	6
Breckinridge County	7
Clark County	4
Hardin County	4
Jefferson County—	
Louisville	7
Monroe County	5
Pike County	4
Spencer County	15
Woodford County	4
Scattering	37
Poliomyelitis:	
Woodford County	1
Scarlet fever:	
Crittenden County	6
Elliott County	4
Scarlet fever—Continued.	Cases.
Jefferson County—	
Louisville	15
Lee County	4
Scattering	32
Septic sore throat	11
Smallpox:	
Lincoln County	6
Whitley County—	
Williamsburg	4
Scattering	14
Syphilis	10
Tonsillitis	8
Trachoma	10
Tuberculosis	34
Typhoid fever:	
Mason County—	
Maysville	7
Scattering	17
Whooping cough	25

SUMMARY OF CASES REPORTED MONTHLY BY STATES.

Tables showing, by counties, the reported cases of cerebrospinal meningitis, malaria, pellagra, poliomyelitis, smallpox, and typhoid fever are published under the names of these diseases. (See names of these and other diseases in the table of contents.)

The following monthly State reports include only those which were received during the current week. These reports appear each week as received.

State.	Cerebrospinal meningitis.	Diphtheria.	Malaria.	Measles.	Pellagra.	Poliomyelitis.	Scarlet fever.	Smallpox.	Typhoid fever.
1919.									
Arizona (December)	.....	15	.....	1	.....	.....	8	11	8
California (November)	5	423	111	828	1	2	497	200	72
Massachusetts (December)	18	1,018	4	2,603	.....	3	1,392	2	53
Montana (November)	1	31	.....	8	.....	2	138	111	22
Nebraska (December)	2	39	.....	15	.....	1	173	524	13
Vermont (December)	.....	15	.....	250	.....	1	40	.....	8
Virginia (November)	3	744	325	91	13	10	310	120	175

ACTINOMYCOSIS.

Massachusetts—December, 1919.

During December, 1919, one case of actinomycosis was reported in Massachusetts.

ANTHRAX.

California, Massachusetts, New York, N. Y., and Philadelphia, Pa.

During the month of November, 1919, one case of anthrax was reported in California. During December, 1919, three cases were reported in Massachusetts. During the week ended December 27, 1919, there were reported two cases in New York, N. Y., and one case and one death in Philadelphia, Pa.

CEREBROSPINAL MENINGITIS.

State Reports for November and December, 1919.

Place.	New cases reported.
California (November):	
Sacramento County—	
Sacramento	1
San Francisco	3
Tehama County—	
Red Bluff	1
Total	5
Massachusetts (December):	
Bristol County—	
New Bedford	1
Essex County—	
Haverhill	1
Lawrence	1
Lynn	1
Salem	1
Hampden County—	
Springfield	1
Westfield (town)	1
Middlesex County—	
Framingham (town)	1
Hudson (town)	2
Cambridge	1
Wakefield (town)	1
Woburn	1
Watertown (town)	1
Massachusetts (December)—Contd.	
Suffolk County—	
Boston	1
Chelsea	1
Worcester County—	
Paxton (town)	1
Fitchburg	1
Total	18
Montana (November):	
Yellowstone County—	
Laurel	1
Nebraska (December):	
Custer County	1
Valley County	1
Total	2
Virginia (November):	
Augusta County	1
Bath County	1
Washington County	1
Total	3

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.
Akron, Ohio	3	
Appleton, Wis		1
Bridgeport, Conn		1
Buffalo, N. Y	1	1
Cambridge, Mass	1	
Charleston, W. Va	1	
Chattanooga, Tenn	1	
Chicago, Ill		1
Detroit, Mich	1	
Fort Wayne, Ind	1	
Gary, Ind	1	
Los Angeles, Calif	1	
Louisville, Ky	1	1
Memphis, Tenn	2	
Milwaukee, Wis	1	
Nashville, Tenn	1	
Newark, N. J	1	1
New York, N. Y	4	2
Philadelphia, Pa		1
Port Huron, Mich		1
Portland, Oreg	1	
Rochester, N. Y		1
Steubenville, Ohio	1	
Waterbury, Conn	1	
Westfield, Mass		1

DIPHTHERIA.

See Telegraphic weekly reports from States, page 136; Monthly summaries by States, page 141; and Weekly reports from cities, page 154.

INFLUENZA.

Mountain Home, Idaho.

Under date of January 13, 1919, 88 cases of influenza were reported at Mountain Home, Elmore County, Idaho. The town was quarantined.

Cases Reported by State Health Officers, Week Ended Jan. 10, 1920.

	Cases.
Arkansas	35
California	24
Connecticut	1
Delaware	1
Florida	2
Georgia	27
Idaho	89
Illinois	73
Indiana	18
Iowa	10
Kansas	17
Louisiana	52
Maine	1
Massachusetts	40
Nebraska	2
New Jersey	23
New Mexico	8
New York (exclusive of New York City)	52
Wisconsin	3

LETHARGIC ENCEPHALITIS.

California and Montana.

During the month of November, 1919, there were reported 15 cases of lethargic encephalitis in California, and 1 case in Montana. During the week ended December 27, 1919, 2 deaths were reported in San Francisco, Calif.

MALARIA.

California, Massachusetts, and Virginia—November and December, 1919.

Place.	New cases reported.
California (November):	
Alameda County—	
Oakland	1
Fresno County—	
Clovis	1
Colusa County	2
Kings County	5
Lemoore	1
Los Angeles County—	
Los Angeles	2
Modoc County	2
Placer County—	
Lincoln	14
Riverside County—	
Riverside	1
San Diego County—	
East San Diego	3
San Francisco	8
Santa Cruz County—	
Santa Cruz	1
Shasta County	69
Sutter County	1
Total	111
Massachusetts (December):	
Hampshire County—	
Northampton	1
Middlesex County—	
Malden	1
Plymouth County—	
Brockton	1
Suffolk County—	
Boston	1
Total	4
Virginia (November):	
Accomac County	23
Parksley	6
Alexandria County—	
Alexandria	1
Brunswick County	5
Lawrenceville	3
Buckingham County	1
Campbell County	2
Caroline County	5
Charles City County	2
Cumberland County	9
Elizabeth City County	5
Hampton	5
Phoebus	1
Virginia (November)—Continued.	
Gloucester County	12
Greene County	2
Greenesville County	5
Emporia	3
Halifax County	3
Hanover County	1
Henrico County	4
Richmond	2
Henry County	1
Isle of Wight County	3
James City County	9
Williamsburg	1
King and Queen County	4
King George County	5
King William County—	
West Point	11
Lancaster County	1
Lee County	1
Louisa County—	
Louisa	1
Lunenburg County	2
Victoria	2
Mecklenburg County	2
Middlesex County	7
Nansemond County	4
Suffolk	19
Whaleyville	2
Northampton County	23
Cape Charles	6
Northumberland County	9
Nottoway County	1
Pittsylvania County	10
Powhatan County	5
Princess Anne County	12
Prince Edward County—	
Farmville	1
Prince George County	4
Hopewell	6
Richmond County	4
Rockbridge County	1
Lexington	1
Southampton County	13
Franklin	5
Surry County	10
Sussex County	16
Warwick County	16
Westmoreland County	5
York County	2
Total	325

MALARIA—Continued.

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Alexandria, La	60		Mobile, Ala		1
Beaumont, Tex		1	New York, N. Y	1	
Charleston, S. C		2	Richmond, Va	1	
Columbus, Ga	1	1	Savannah, Ga	2	
Los Angeles, Calif	1				

MEASLES.

See Telegraphic weekly reports from States, page 136; Monthly summaries by States, page 141; and Weekly reports from cities, page 154.

PELLAGRA.

California and Virginia—November, 1919.

Place.	New cases reported.	Place.	New cases reported.
California:		Virginia.—Continued.	
Fresno	1	Louisa County	1
Virginia:		Madison County	1
Brunswick County	1	Mecklenburg County	1
Carroll County	1	Pittsylvania County	1
Fairfax County	1	Prince George County—	
Halifax County—		Hopewell	1
Clover	1	Washington County	1
Henrico County	1	Wise County	1
Richmond	1	Total	13

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Charleston, S. C		1	Oakland, Calif	1	
Columbus, Ga	1	1	Raleigh, N. C		1
Dallas, Tex		1	Savannah, Ga		2

PLAGUE.

New Orleans, La.

The table on page 145 gives a record of rodent cases of plague at New Orleans, La., from December 26 to January 9, and is a continuation of the table printed on page 33 of the Public Health Reports dated January 2, 1920. No cases were reported on December 25.

No case of human plague in New Orleans has been confirmed since December 30, 1919.

Rodent Cases of Plague, New Orlean, La.

Date confirmed.	Mus Alexandrinus.	Mus musculus.	Mus Norvegicus.	Mus rattus.	Total rodents plague infected.
1919.					
Dec. 26	2	1	6	6	15
Dec. 27	2		4	1	7
Dec. 28	5		4	5	14
Dec. 29			8		8
Dec. 30			1		1
Dec. 31	1		4	2	7
1920.					
Jan. 1	2	1	2	1	6
Jan. 2	1		6		7
Jan. 3	1		3	2	6
Jan. 4			3	1	4
Jan. 5		1	2	2	5
Jan. 6			3		3
Jan. 7	6		1	9	16
Jan. 8				1	1
Jan. 9	1		3	2	6

PNEUMONIA (ALL FORMS).

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Alliance, Ohio		1	East Chicago, Ind		7
Alton, Ill	3		Easthampton, Mass		1
Anaconda, Mont		1	East Orange, N. J	5	
Appleton, Wis		3	East St. Louis, Ill	1	2
Arlington, Mass	1	1	Elgin, Ill		1
Ashland, Ky	1		Elmira, N. Y		1
Ashtabula, Ohio		2	El Paso, Tex		4
Atlanta, Ga		7	Englewood, N. J		1
Atlantic City, N. J	4		Fall River, Mass	3	3
Aurora, Ill	3		Fond du Lac, Wis		2
Bakersfield, Calif	2		Fort Wayne, Ind		3
Baltimore, Md	51	26	Fort Worth, Tex	5	5
Barberton, Ohio		1	Framingham, Mass	1	
Baton Rouge, La	3	3	Freeport, Ill	3	1
Beatrice, Nebr		1	Fremont, Nebr		1
Belleville, N. J	1		Fresno, Calif		3
Berkeley, Calif		2	Galesburg, Ill		2
Binghamton, N. Y	4	2	Gardner, Mass	1	
Birmingham, Ala		6	Gary, Ind		1
Bloomington, Ind		1	Geneva, N. Y		1
Boston, Mass	25	23	Glens Falls, N. Y		2
Bristol, Conn	4	1	Grand Rapids, Mich	6	3
Brookline, Mass	1		Greeley, Colo	1	
Brunswick, Ga	1	1	Green Bay, Wis		1
Buffalo, N. Y	14	15	Greenfield, Mass		1
Burlington, Vt	2	1	Greenwich, Conn	1	
Butte, Mont		1	Hackensack, N. J		2
Cairo, Ill		3	Hammond, Ind	1	4
Cambridge, Mass	5	2	Harrison, N. J	2	
Camden, N. J	5		Hartford, Conn		2
Canton, Ohio	2		Haverhill, Mass	4	
Cape Girardeau, Mo		1	Highland Park, Mich	6	3
Charleston, S. C		6	Hoboken, N. J		1
Charlotte, N. C	2	3	Holyoke, Mass	2	2
Chelsea, Mass	1	3	Hoquiam, Wash	1	
Chicago, Ill	272	86	Hot Springs, Ark	1	
Chicopee, Mass		2	Houston, Tex		5
Cincinnati, Ohio	2	17	Huntington, W. Va		3
Cleveland, Ohio	17	14	Independence, Mo	2	4
Clinton, Mass		1	Ironwood, Mich		1
Colorado Springs, Colo		3	Ishpeming, Mich	1	
Columbus, Ga	6	3	Ithaca, N. Y	1	1
Columbus, Ohio		7	Jamestown, N. Y		3
Covington, Ky	2	1	Jersey City, N. J	5	
Cumberland, Md	8	1	Kalamazoo, Mich	1	1
Dallas, Tex	1	1	Kansas City, Kans	4	
Dayton, Ohio	1		Kansas City, Mo	16*	11
Denver, Colo		11	Kearny, N. J	1	
Detroit, Mich	29	37	Keene, N. H	1	1
Dubuque, Iowa		1	Kenosha, Wis	2	2
Duluth, Minn		1	Kewanee, Ill		1

PNEUMONIA (ALL FORMS)—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Kokomo, Ind.		1	Perth Amboy, N. J.		2
LaCrosse, Wis.		1	Petersburg, Va.		2
Lawrence, Mass.	3	1	Philadelphia, Pa.	64	43
Lexington, Ky.		3	Piqua, Ohio.		1
Lincoln, Nebr.		3	Plattsburgh, N. Y.		1
Lockport, N. Y.	1	1	Pontiac, Mich.	1	2
Long Beach, Calif.	3	3	Port Huron, Mich.	1	1
Long Branch, N. J.	1	1	Portland, Me.	1	1
Los Angeles, Calif.	24	6	Portland, Oreg.		5
Louisville, Ky.	8	10	Portsmouth, Va.		1
Lowell, Mass.	1	5	Quincy, Ill.		1
Lynchburg, Va.		4	Racine, Wis.		5
Lynn, Mass.	1		Reno, Nev.	1	
Madison, Wis.		1	Richmond, Va.		6
Malden, Mass.	3	3	Roanoke, Va.		2
Manchester, N. H.	2	2	Rochester, N. Y.	6	4
Mankato, Minn.		1	Rome, N. Y.	1	
Marquette, Mich.	2	2	Sacramento, Calif.		5
Mason City, Iowa.		1	Saginaw, Mich.		1
Medford, Mass.	1	1	St. Joseph, Mo.		6
Melrose, Mass.		1	St. Paul, Minn.		7
Memphis, Tenn.		7	Salem, Oreg.		1
Milwaukee, Wis.		15	Salt Lake City, Utah.		5
Minneapolis, Minn.		9	San Bernardino, Calif.		1
Mishawaka, Ind.		1	San Diego, Calif.		1
Mobile, Ala.		1	Sandusky, Ohio.	1	
Moline, Ill.		1	San Francisco, Calif.		10
Montclair, N. J.	1		Santa Cruz, Calif.		1
Montgomery, Ala.		1	Saratoga Springs, N. Y.	1	
Morgantown, W. Va.	1	1	Schenectady, N. Y.	1	
Mount Vernon, N. Y.	2		Sioux Falls, S. Dak.	1	
Nashville, Tenn.		3	South Bend, Ind.		3
Newark, N. J.	80	12	Springfield, Ill.		6
Newark, Ohio.		1	Springfield, Mass.	4	2
New Bedford, Mass.	2	9	Springfield, Ohio.		2
New Britain, Conn.		2	Stockton, Calif.	2	
Newburgh, N. Y.	2	2	Syracuse, N. Y.		6
Newburyport, Mass.	1		Taunton, Mass.	1	3
New Haven, Conn.		6	Terre Haute, Ind.		1
New Orleans, La.		16	Tiffin, Ohio.		1
New York, N. Y.	295	166	Toledo, Ohio.		3
Niagara Falls, N. Y.	4	1	Topeka, Kans.		2
Northampton, Mass.	2	1	Trenton, N. J.	3	3
Norwalk, Conn.		1	Troy, N. Y.		2
Oakland, Calif.		4	Waltham, Mass.	2	1
Oak Park, Ill.	5		Washington, D. C.		14
Oklahoma City, Okla.	2	2	West Hoboken, N. J.	1	
Olean, N. Y.		1	West Orange, N. J.	2	
Omaha, Nebr.		12	White Plains, N. Y.	1	1
Orange, N. J.	9	3	Wichita, Kans.	3	
Parsons, Kans.	1		Wilmington, Del.		3
Passaic, N. J.		3	Winston-Salem, N. C.	2	1
Paterson, N. J.	9		Worcester, Mass.	11	8
Pawtucket, R. I.		3	Yonkers, N. Y.	1	5

POLIOMYELITIS (INFANTILE PARALYSIS).

State Reports for November and December, 1919.

Place.	New cases reported.
California (November):	
Los Angeles County—	
Los Angeles	1
Placer County—	
Roseville	1
Total	2
Massachusetts (December):	
Norfolk County—	
Needham (town)	1
Middlesex County—	
Lowell	1
Suffolk County—	
Winthrop (town)	1
Total	3
Montana (November):	
Custer County—	
Miles City (R. D.)	1
Fergus County—	
Novary	1
Total	2
Nebraska (December):	
Sarpy County	1
Vermont (December):	
Lamoille County—	
Wolcott	1
Virginia (November):	
Augusta County	1
Campbell County	1
Floyd County	1
Giles County	1
Narrows	1
Henrico County—	
Richmond	1
Lee County—	
Rose Hill	1
Pittsylvania County	2
Scott County	1
Washington County	1
Total	10

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Kansas City	1	.....	New York, N. Y	1	.....
Los Angeles, Calif	1	1			

RABIES IN ANIMALS.

Marshalltown, Iowa—Week Ended Dec. 27, 1919.

During the week ended December 27, 1919, two cases of rabies in animals were reported in Marshalltown, Iowa.

RABIES IN MAN.

Akron, Ohio—Week Ended Dec. 27, 1919.

During the week ended December 27, 1919, one case of rabies in man was reported at Akron, Ohio.

SCARLET FEVER.

See Telegraphic weekly reports from States, page 136; Monthly summaries by States, page 141; and Weekly reports from cities, page 154.

SMALLPOX.

Escambia County, Fla.

On January 12, 1920, an outbreak of mild smallpox was reported in the northern part of Escambia County, Fla. About 100 cases had been notified.

SMALLPOX—Continued.

California, Massachusetts, and Montana—November and December, 1919—Vaccination Histories.

Place.	New cases reported.	Deaths.	Vaccination history of cases.			
			Vaccinated within 7 years preceding attack.	Last vaccinated more than 7 years preceding attack.	Never successfully vaccinated.	History not obtained or uncertain.
California (November):						
Alameda County—						
Alameda	1				1	
Berkeley	1				1	
Oakland	19		1	2	16	
Amador County	1			1		
Jackson	1				1	
Butte County	1				1	
Chico	2				2	
Calaveras County	1			1		
Contra Costa County—						
Antioch	1					1
Pittsburg	7					7
Fresno County	1				1	
Humboldt County	14		1	2	11	
Blue Lake	1			1		
Eureka	12				11	1
Los Angeles County	8				8	
Long Beach	2			2		
Los Angeles	9				9	
Pasadena	1				1	
Pomona	3				3	
Whittier	12			1	11	
Modoc County	1				1	
Monterey County	1				1	
Napa County	2					2
Napa City	9				9	
Orange County—						
Brea	11			1	10	
Fullerton	2				2	
Orange	1				1	
Santa Ana	1				1	
Riverside County	3				3	
Blythe	5			1	4	
San Bernardino County—						
Chino	3				3	
Needles	2				1	1
San Diego County	1					1
Oceanside	3				2	1
San Francisco	3			1	2	
San Joaquin County	4				4	
Manteca	10				10	
Stockton	1				1	
Santa Clara County—						
San Jose	1				1	
Shasta County	7		1	3	3	
Trinity County	3				3	
Tulare County—						
Dinuba	1				1	
Ventura County	3				3	
Fillmore	23				23	
Santa Paula	1				1	
Total	200		3	16	167	14
Massachusetts (December):						
Bristol County—						
Fall River	2	2		1	1	
Montana (November):						
Blaine County—						
Chinook (R. D.)	2				2	
Cascade County—						
Great Falls	2				2	
Custer County—						
Miles City	2				2	
Fergus County—						
Lewiston (1 R. D.)	17				17	

SMALLPOX—Continued.

California, Massachusetts, and Montana—November and December, 1919—Vaccination Histories—Continued.

Place.	New cases reported.	Deaths.	Vaccination history of cases.			
			Vaccinated within 7 years preceding attack.	Last vaccinated more than 7 years preceding attack.	Never successfully vaccinated.	History not obtained or uncertain.
Montana (November)—Contd.						
Flathead County—						
Polson (R. D.)	1		1			
Whitefish	1				1	
Lincoln County—						
Libby (2 R. D.)	14				14	
Troy (7 R. D.)	13				8	5
Missoula County—						
Missoula	1				1	
Pondera County—						
Valier	1				1	
Ravalli County—						
Hamilton (2 R. D.)	4				4	
Stevensville	1				1	
Roosevelt County—						
Wolf Point (1 R. D.)	20				20	
Rosebud County—						
Forsyth	4				4	
Lee	1				1	
Rosebud	3				3	
Sanders County—						
Paradise	1				1	
Valley County—						
Glasgow (1 R. D.)	17				17	
Paisley	2				2	
Wheatland County—						
Harlowton (R. D.)	1				1	
Judith Gap	2			1	1	
Yellowstone County—						
Billings	1				1	
Total	111		1	1	104	5

Arizona, Nebraska, and Virginia—November and December, 1919.

Place.	Cases.	Deaths.
Arizona (December):		
Maricopa County	8	
Gila County	2	
Yavapai County	1	
Total	11	
Nebraska (December):		
Adams County	4	
Antelope County	14	
Boone County	2	
Box Butte County	28	
Burt County	30	
Butler County	16	
Cass County	3	
Cheyenne County	33	
Clay County	1	
Colfax County	2	
Custer County	37	
Dawson County	3	
Dodge County	8	
Douglas County	16	
Gage County	27	
Gosper County	18	
Holt County	16	
Kearney County	1	
Keith County	1	
Nebraska (December)—Con.		
Lancaster County	29	
Madison County	13	
Merrick County	6	
Nemaha County	20	
Nuckolls County	4	
Otoe County	2	
Pawnee County	8	
Phelps County	3	
Polk County	3	
Richardson County	83	
Saline County	1	
Saunders County	62	
Scotts Bluff County	4	
Seward County	1	
Sheridan County	7	
Thomas County	3	
Webster County	3	
York County	12	
Total	524	
Virginia (November):		
Alleghany County—		
Clifton Forge	2	
Covington	3	
Appomattox County	1	

SMALLPOX—Continued.

Arizona, Nebraska, and Virginia—November and December, 1919—Continued.

Place	Cases.	Deaths.
Virginia (November)—Contd.		
Bedford County	1	
Campbell County	1	
Franklin County	1	
Green County	10	
Henrico County—		
Richmond	1	
Henry County	4	
Martinsville	5	
James City County—		
Williamsburg	1	
Mecklenburg County	4	
Montgomery County	2	
Lafayette	15	
Radford	1	
Norfolk County	2	
Patrick County	2	
Pittsylvania County	4	
Prince William County	1	
Pulaski County	4	
Roanoke County—		
Roanoke	5	
Rockingham County	15	
Elkton	3	
Scott County	4	
Southampton County	8	
Spottsylvania County—		
Fredericksburg	10	
Stafford County—		
Falmouth	1	
Wise County	1	
Dorchester	2	
Norton	6	
Total	120	

Vaccinations on the Canadian Border, November and December, 1919.

Reports from Public Health Service officers engaged in border quarantine activities against smallpox in the Province of Ontario, Canada, show that during the months of November and December 20,991 vaccinations were performed. Stations are being maintained at six points of entry.

The following table gives the number of vaccinations performed at these stations for the two months mentioned:

Vaccinations performed in November.[1]

Buffalo	489
Detroit	1,559
Niagara Falls	449
Ogdensburg	6
Port Huron	840

Vaccinations performed in December.

Buffalo	2,291
Detroit	9,355
Niagara Falls	2,429
Ogdensburg	265
Port Huron	2,464
Sault Ste. Marie	844

[1] For five days only.

SMALLPOX—Continued.

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Alameda, Calif.	1		La Fayette, Ind.	3	
Alton, Ill.	1		Lincoln, Nebr.	5	
Atlanta, Ga.	1		Logansport, Ind.	1	
Bellingham, Wash.	7		Los Angeles, Calif.	4	
Birmingham, Ala.	2		Ludington, Mich.	1	
Bloomington, Ill.	1		Madison, Wis.	1	
Boise, Idaho.	4		Marinette, Wis.	2	
Buffalo, N. Y.	5		Marion, Ohio.	2	
Canton, Ohio.	4		Mason City, Iowa.	3	
Cedar Rapids, Iowa.	1		Milwaukee, Wis.	4	
Cheyenne, Wyo.	1		Minneapolis, Minn.	13	
Chillicothe, Ohio.	3		Mishawaka, Ind.	1	
Cincinnati, Ohio.	11		Monmouth, Ill.	29	
Colorado Springs, Colo.	1		Muskogee, Okla.	1	
Columbus, Ga.	2		New Orleans, La.	1	2
Dallas, Tex.	21		New York, N. Y.	1	
Danville, Ill.	1		Ogden, Utah.	42	
Davenport, Iowa.	18		Oklahoma City, Okla.	1	
Denver, Colo.	40		Omaha, Nebr.	7	
Detroit, Mich.	14	1	Oshkosh, Wis.	1	
Dubuque, Iowa.	2		Piqua, Ohio.	2	
East Cleveland, Ohio.	1		Pocatello, Idaho.	15	
Eau Claire, Wis.	2		Portland, Oreg.	90	
El Paso, Tex.	1		Portsmouth, Va.	2	
Eugene, Oreg.	1		Racine, Wis.	3	
Everett, Wash.	1		Reno, Nev.	1	
Fall River, Mass.	2	2	Riverside, Calif.	9	
Fargo, N. Dak.	1		Roanoke, Va.	1	
Galesburg, Ill.	2		Rock Island, Ill.	2	
Grand Rapids, Mich.	1		Sacramento, Calif.	1	
Great Falls, Mont.	1		St. Cloud, Minn.	5	
Green Bay, Wis.	6		St. Joseph, Mo.	26	
Hammond, Ind.	1		St. Louis, Mo.	1	
Hibbing, Minn.	1		St. Paul, Minn.	3	
Hoquiam, Wash.	3		Salt Lake City, Utah.	6	
Hot Springs, Ark.	1		San Diego, Calif.	1	
Houston, Tex.	7		Sandusky, Ohio.	1	
Huntington, Ind.	3		San Jose, Calif.	1	
Huntington, W. Va.	2		Seattle, Wash.	30	
Indianapolis, Ind.	11		Spokane, Wash.	48	
Ironwood, Mich.	1		Stockton, Calif.	1	
Janesville, Wis.	3		Superior, Wis.	4	
Kalamazoo, Mich.	1		Waco, Tex.	1	
Kansas City, Kans.	11		Walla Walla, Wash.	1	
Kansas City, Mo.	12	1	Waterbury, Conn.	5	
Kenosha, Wis.	1		Wausau, Wis.	3	
Kokomo, Ind.	19		Wichita, Kans.	1	
La Crosse, Wis.	2		Yakima, Wash.	7	

TETANUS.

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Burlington, Vt.		1	Sacramento, Calif.	1	1
Chicago, Ill.	1				

TUBERCULOSIS.

See Telegraphic weekly reports from States, p. 136; and Weekly reports from cities, p. 154.

TYPHOID FEVER.

State Reports for November and December, 1919.

Place.	New cases reported.
Arizona (December):	
Maricopa County	7
Pinal County	1
Total	8
California (November):	
Alameda County—	
Alameda	2
Berkeley	1
Oakland	4
Butte County—	
Chico	1
Oroville	3
Fresno County	8
Fresno	2
Humboldt County	1
Imperial County—	
Calexico	1
El Centro	1
Kern County	4
Los Angeles County	2
Los Angeles	16
Pasadena	1
San Fernando	1
Santa Monica	2
Madera County—	
Madera	1
Monterey County	1
Orange County	1
Sacramento County—	
Sacramento	3
San Bernardino County	2
San Francisco County	5
San Joaquin County—	
Stockton	3
San Luis Obispo County—	
San Luis Obispo	1
Santa Clara County—	
Gilroy	1
Santa Cruz County	1
Tehama County	1
Tulare County—	
Dinuba	1
Ventura County—	
Santa Paula	1
Total	72
Massachusetts (December):	
Berkshire County—	
Great Barrington (town)	1
Bristol County—	
Fall River	5
New Bedford	3
Essex County—	
Beverly	2
Gloucester	1
Haverhill	1
Lawrence	5
Melrose	1
Methuen	1
Swampscott (town)	1
Franklin County—	
Greenfield (town)	1
Springfield	1
Hampden County—	
Russell (town)	1
Hampshire County—	
Northampton	2
Middlesex County—	
Cambridge	1
Everett	1
Lowell	1
Marlboro	1
Woburn	1
Norfolk County—	
Quincy	1
Stoughton (town)	1

Place.	New cases reported.
Massachusetts (December)—Contd.	
Plymouth County—	
Brockton	2
Marshfield (town)	2
Middleboro (town)	1
Plymouth (town)	3
Suffolk County—	
Boston	2
Worcester County—	
Fitchburg	1
Grafton (town)	1
Leominster	2
Northbridge (town)	1
Southbridge (town)	1
Sturbridge (town)	1
Webster (town)	1
Worcester	2
Total	53
Montana (November):	
Beaverhead County—	
Dillon	2
Blaine County—	
Chinook (R. D.)	2
Cascade County—	
Black Eagle	1
Custer County—	
Miles City (R. D.)	2
Dawson County—	
Glendive	1
Fergus County—	
Lewistown (R. D.)	1
Flathead County—	
Whitefish	2
Hill County—	
Havre (R. D.)	3
Missoula County—	
Missoula	1
Pondera County—	
Conrad	2
Fowler (R. D.)	2
Valier	2
Yellowstone County—	
Huntley	1
Total	22
Nebraska (November):	
Douglas County	2
Holt County	1
Lancaster County	1
Phelps County	2
Thurston County	7
Total	13
Vermont (December):	
Addison County	6
Chittenden County	1
Washington County	1
Total	8
Virginia (November):	
Accomac County	6
Alexandria County—	
Alexandria	1
Alleghany County	2
Clifton Forge	2
Augusta County	1
Bath County	1
Bedford County	2
Bland County	4
Botetourt County—	
Glen Wilton	1
Brunswick County	1
Buchanan County	4
Grundy	3

TYPHOID FEVER—Continued.

State Reports for November and December, 1919—Continued.

Place.	New cases reported.
Virginia (November)—Continued.	
Buckingham County	1
Campbell County	1
Carroll County	3
Charles City	2
Clarke County—	
White Post	1
Culpeper County	8
Dickenson County	2
Elizabeth City County—	
Hampton	1
Fauquier County	2
Floyd County	1
Frederick County	1
Gloucester County	8
Goochland County	1
Grayson County	3
Halifax County	2
Henrico County	1
Richmond	6
Isle of Wight County	1
James City County	5
King William County	1
Lancaster County	2
Lee County	2
Keokee	1
Pennington Gap	1
Louisa County	1
Middlesex County	1
Montgomery County	4
Radford	2
Nansemond County—	
Whaleyville	1
Nelson County	2
New Kent County	1
Norfolk County—	
Norfolk	11
Portsmouth	1
Northampton County	2
Northumberland County	1
Orange County	1
Page County	1
Patrick County	1
Prince George County	1
Rappahannock County	2
Roanoke County	3
Roanoke	2
Rockbridge County	3
Rockingham County	3
Harrisonburg	1
Russell County	4
Scott County	1
Shenandoah County	3
Southampton County	3
Sussex County	5
Tazewell County	7
Warwick County	1
Washington County	12
Westmoreland County	3
Wise County	5
Wythe County	1
Total	175

City Reports for Week Ended Dec. 27, 1919.

Place.	Cases.	Deaths.
Akron, Ohio	2	
Atlanta, Ga	1	
Baltimore, Md	5	1
Beatrice, Nebr	1	
Braddock, Pa	7	
Brockton, Mass	1	
Buffalo, N. Y	1	
Butler, Pa	1	
Carnegie, Pa	1	
Centralia, Ill	1	
Charleston, S. C	1	
Chester, Pa	1	
Chicago, Ill	1	3
Cincinnati, Ohio	1	1
Cleveland, Ohio	1	1
Columbia, S. C	1	
Columbus, Ga	1	
Columbus, Ohio	1	
Detroit, Mich	2	2
Duluth, Minn	1	
East St. Louis, Ill	1	
Everett, Mass	1	
Fort Wayne, Ind	1	
Fort Worth, Tex		1
Greenfield, Mass	1	
Hartford, Conn		1
Highland Park, Mich	1	
Huntington, Ind	1	
Kalamazoo, Mich	1	
Kansas City, Mo	4	1
Lawrence, Mass	1	
Lexington, Ky	2	
Lima, Ohio	1	
Lincoln, Nebr	1	
Lockport, N. Y	2	
Los Angeles, Calif	1	
Louisville, Ky	2	
Lowell, Mass	1	
Mattoon, Ill	1	
Milwaukee, Wis	1	
Minneapolis, Minn	1	
Morgantown, W. Va	1	
Newark, N. J	2	
New Bedford, Mass	1	
New Castle, Pa	1	
New Haven, Conn	1	
New Orleans, La	2	
New York, N. Y	2	3
Northampton, Mass	1	
North Little Rock, Ark	1	
Ogden, Utah	1	1
Oklahoma City, Okla	1	
Omaha, Nebr	1	
Parkersburg, W. Va	1	
Petersburg, Va	1	1
Philadelphia, Pa	3	1
Pontiac, Mich	2	
Reading, Pa	2	
Richmond, Va	1	1
Rochester, N. Y	1	1
Rome, Ga	1	
St. Louis, Mo	2	
St. Paul, Minn	3	
Seattle, Wash	1	
Syracuse, N. Y	3	1
Tiffin, Ohio	1	
Trenton, N. J	1	
Washington, D. C	1	1
Wilmington, Del	1	1
Windham, Conn	1	

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City Reports for Week Ended Dec. 27, 1919.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Adams, Mass.	14,406	3	1	.....	.....	.....	.....	.....	.....	.....
Akron, Ohio.	93,604	26	13	.....	31	.....	56	.....	23	.....
Alameda, Calif.	28,433	7	5	.....	4	.....	2	.....	1	1
Alexandria, La.	16,232	6	.....	.....	.....	.....	.....	.....	1	.....
Alexandria, Va.	17,935	3	1	.....	.....	.....	.....	.....	.....	.....
Allentown, Pa.	65,109	.....	6	.....	9	.....	3	.....	1	.....
Alliance, Ohio.	19,581	9	1	.....	1	.....	4	.....	1	.....
Alton, Ill.	23,783	9	1	.....	1	.....	2	.....	.....	.....
Amesbury, Mass.	10,200	3	.....	.....	.....	.....	.....	.....	1	.....
Anaconda, Mont.	10,631	2	.....	.....	.....	.....	.....	.....	.....	.....
Ann Arbor, Mich.	15,041	6	2	.....	1	.....	.....	.....	.....	.....
Anniston, Ala.	14,326	.....	2	.....	.....	.....	.....	.....	.....	.....
Ansonia, Conn.	16,954	1	.....	.....	2	.....	1	.....	.....	.....
Appleton, Wis.	18,005	4	.....	.....	.....	.....	.....	.....	.....	.....
Arlington, Mass.	13,073	3	.....	.....	.....	.....	.....	.....	.....	.....
Asbury Park, N. J.	14,629	0	.....	.....	.....	.....	.....	.....	.....	.....
Ashtabula, Ohio.	22,008	15	.....	.....	.....	.....	.....	.....	.....	.....
Atlanta, Ga.	196,144	43	7	.....	5	.....	6	.....	1	2
Atlantic City, N. J.	59,515	15	10	1	28	.....	2	.....	2	1
Attleboro, Mass.	19,776	4	1	.....	.....	.....	6	.....	.....	1
Auburn, N. Y.	37,823	10	1	1	.....	.....	1	.....	2	1
Aurora, Ill.	34,795	12	.....	.....	.....	.....	.....	.....	.....	.....
Austin, Tex.	35,612	16	2	.....	.....	.....	.....	.....	.....	2
Bakersfield, Calif.	17,543	4	2	.....	.....	.....	2	.....	.....	.....
Baltimore, Md.	594,637	214	32	4	58	.....	28	.....	27	25
Bangor, Me.	26,958	.....	.....	.....	.....	.....	12	.....	.....	.....
Barberton, Ohio.	14,187	5	1	.....	.....	.....	.....	.....	.....	1
Baton Rouge, La.	17,544	6	.....	.....	.....	.....	1	.....	.....	.....
Battle Creek, Mich.	30,159	.....	5	.....	1	.....	8	.....	.....	.....
Bayonne, N. J.	72,204	.....	4	.....	2	.....	1	.....	1	.....
Beatrice, Nebr.	10,437	2	.....	.....	.....	.....	.....	.....	.....	.....
Beaumont, Tex.	28,851	7	.....	.....	.....	.....	.....	.....	.....	.....
Bedford, Ind.	10,613	3	.....	.....	.....	.....	.....	.....	.....	2
Belleville, N. J.	12,797	.....	1	.....	.....	.....	.....	.....	3	.....
Bellingham, Wash.	34,362	.....	1	.....	1	.....	2	.....	.....	.....
Beloit, Wis.	18,547	8	1	.....	.....	.....	3	.....	.....	.....
Berkeley, Calif.	60,427	14	1	.....	19	.....	2	.....	1	.....
Berlin, N. H.	13,892	3	.....	.....	.....	.....	.....	.....	.....	1
Beverly, Mass.	22,128	.....	.....	.....	6	.....	2	.....	.....	.....
Biddeford, Me.	17,760	4	.....	.....	.....	.....	.....	.....	.....	.....
Billings, Mont.	15,123	6	.....	.....	1	.....	.....	.....	.....	.....
Binghamton, N. Y.	54,864	18	2	.....	1	.....	.....	.....	1	2
Birmingham, Ala.	189,716	36	3	2	13	.....	3	1	8	2
Bloomfield, N. J.	19,013	2	.....	.....	1	.....	4	.....	1	.....
Bloomington, Ill.	27,462	8	1	.....	.....	.....	3	.....	1	.....
Bloomington, Ind.	11,661	1	.....	.....	5	.....	.....	.....	.....	.....
Boise, Idaho.	35,951	5	.....	.....	1	.....	2	.....	.....	.....
Boston, Mass.	767,813	221	61	3	212	1	66	2	34	19
Braddock, Pa.	22,060	.....	.....	.....	34	.....	.....	.....	1	.....
Bradford, Pa.	[1] 14,544	.....	.....	.....	.....	.....	1	.....	.....	.....
Brazil, Ind.	10,472	0	.....	.....	.....	.....	.....	.....	.....	.....
Bridgeport, Conn.	124,724	38	14	2	25	.....	2	1	.....	4
Bristol, Conn.	16,318	3	2	.....	.....	.....	2	.....	2	.....
Brockton, Mass.	69,152	22	4	.....	76	1	2	.....	1	2
Brookline, Mass.	33,526	7	1	.....	3	.....	.....	.....	.....	.....
Brunswick, Ga.	10,984	4	.....	.....	.....	.....	.....	.....	.....	1
Buffalo, N. Y.	475,781	138	81	7	13	.....	21	2	14	7
Burlington, Iowa.	25,144	.....	1	.....	.....	.....	3	.....	.....	.....
Burlington, Vt.	21,802	13	.....	.....	.....	.....	.....	.....	.....	.....
Butler, Pa.	28,677	.....	11	.....	.....	.....	7	.....	.....	.....
Butte, Mont.	44,057	14	1	.....	.....	.....	.....	.....	.....	3
Cadillac, Mich.	10,158	2	2	.....	6	.....	.....	.....	.....	.....
Cairo, Ill.	15,995	11	2	.....	.....	.....	1	.....	.....	5
Cambridge, Mass.	114,293	30	12	.....	24	.....	3	.....	3	4
Camden, N. J.	108,117	.....	4	.....	3	.....	4	.....	.....	.....
Canton, Ill.	13,674	3	.....	.....	.....	.....	.....	.....	.....	.....
Canton, Ohio.	62,566	18	6	1	.....	.....	1	.....	1	.....
Cape Girardeau, Mo.	11,146	5	.....	.....	.....	.....	1	.....	.....	.....
Carbondale, Pa.	19,597	.....	.....	.....	.....	.....	1	.....	.....	.....
Carlisle, Pa.	10,795	.....	1	.....	.....	.....	1	.....	.....	.....
Carnegie, Pa.	11,963	.....	3	.....	.....	.....	.....	.....	.....	.....
Cedar Rapids, Iowa.	38,033	.....	1	.....	.....	.....	1	.....	.....	.....

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Centralia, Ill	11,838	5								
Chambersburg, Pa	12,475		2		1					
Chanute, Kans	12,968	4					2			
Charleston, S. C	61,041	30	4		1		2			1
Charleston, W. Va	31,060	4					1			
Charlotte, N. C	40,759	17							1	
Chattanooga, Tenn	61,575	13					4			3
Chelsea, Mass	48,405	16	7				3			1
Chester, Pa	41,857		1						1	
Cheyenne, Wyo	[1] 11,320	4			1		1			
Chicago, Ill	2,547,201	604	115	14	143	3	165	4	204	48
Chicopee, Mass	29,950	8	3		2		4		2	
Chillicothe, Ohio	15,625	6	1				1			
Cincinnati, Ohio	414,248	130	18	3	39	1	63	1	14	17
Cleveland, Ohio	692,259	168	51	3	129	4	16		23	6
Clinton, Mass	[1] 13,075	8	1						1	
Coatesville, Pa	14,998		1				1		6	
Coffeyville, Kans	18,331	1	1				5			
Cohoes, N. Y	25,292	8								1
Colorado Springs, Colo	38,965	9	1		1		2		4	3
Columbia, S. C	35,165		2						1	
Columbus, Ga	26,306	21					1		3	2
Columbus, Ohio	220,135	69	4		2		5	1	5	6
Concord, N. H	22,858	7			1		3		1	
Connellsville, Pa	15,876						1			
Corpus Christi, Tex	10,789	2								1
Cortland, N. Y	13,321	2					3			
Covington, Ky	59,623	15	2		9		2			3
Cranston, R. I	26,773	2	1		2		1			
Cumberland, Md	26,686	7			1				1	1
Dallas, Tex	129,738	40	16	1	1		1		3	4
Danbury, Conn	22,931	8								
Danville, Ill	32,969	7			2					
Davenport, Iowa	49,618		2	1						
Dayton, Ohio	128,939	37	1		1		7			
Dedham, Mass	10,618	3	2		49	1	1			
Denver, Colo	268,439	82	9		1		11			17
Des Moines, Iowa	104,052		6	1			9	1		
Detroit, Mich	619,648	207	88	9	69	2	77		16	20
Dover, N. H	13,276	8	1							1
Du Bois, Pa	14,994		1				1			
Dubuque, Iowa	40,096	19	1				2			
Duluth, Minn	97,077	9	2		1		2		5	
Dunkirk, N. Y	21,311	4					1			1
Dunmore, Pa	21,286						1			
Durham, N. C	26,160	3	2				1			
East Chicago, Ind	30,286	14								1
East Cleveland, Ohio	13,864				3					
Easthampton, Mass	10,656						5			
Easton, Pa	30,854		2						1	
East Orange, N. J	43,761	7	2		3		3			
East Providence, R. I	18,485		2		1		2			
East St. Louis, Ill	77,312	15	1		9		1		2	
Eau Claire, Wis	18,887						1			
Elgin, Ill	28,562	6					1			
Elizabeth, N. J	88,830		4		16		9	1	4	1
Elmira, N. Y	38,272	14			24		1			2
El Paso, Tex	69,149	30	2	1			1			6
Elwood, Ind	[1] 11,028	1								1
Englewood, N. J	12,603	4	2							
Erie, Pa	76,592		12				8		4	
Eugene, Oreg	14,257		1		1		1			
Eureka, Calif	15,142	2					2			
Evanston, Ill	29,304	8			1		3			
Everett, Mass	40,160	14	14				1			1
Fairmont, W. Va	16,111		1				2			
Fall River, Mass	129,828	32	11		1		5		6	3
Fargo, N. Dak	17,872	7	1				14			
Findlay, Ohio	[1] 14,858	3								
Fond du Lac, Wis	21,485	8								

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Fort Dodge, Iowa	21,039	.....	1	.....	.....	.....	1	.....	.....	.....
Fort Scott, Kans.	10,564	3	.....	.....	.....	.....	.....	.....	.....	.....
Fort Smith, Ark.	29,390	.....	3	.....	.....	.....	5	.....	.....	.....
Fort Wayne, Ind.	78,014	21	4	.....	.....	.....	6	.....	8	1
Fort Worth, Tex.	109,597	31	8	2	.....	.....	.....	.....	1	1
Fostoria, Ohio.	10,959	0	.....	.....	.....	.....	.....	.....	.....	.....
Framingham, Mass.	14,149	2	.....	.....	2	.....	4	.....	1	.....
Freeport, Ill.	19,844	6	1	.....	.....	.....	2	.....	.....	.....
Fremont, Nebr.	10,080	6	.....	.....	.....	.....	.....	.....	.....	.....
Fremont, Ohio.	11,034	2	.....	.....	.....	.....	.....	.....	.....	.....
Fresno, Calif.	36,314	10	4	.....	1	.....	4	.....	.....	.....
Galesburg, Ill.	24,629	6	.....	.....	.....	.....	.....	.....	.....	.....
Galveston, Tex.	42,650	10	4	.....	.....	.....	.....	.....	2	2
Gardner, Mass.	17,534	6	.....	.....	.....	.....	2	.....	.....	.....
Gary, Ind.	56,000	8	2	.....	3	.....	1	.....	.....	.....
Geneva, N. Y.	13,915	2	.....	.....	1	.....	4	.....	.....	1
Glens Falls, N. Y.	17,160	5	.....	.....	.....	.....	.....	.....	.....	.....
Grand Rapids, Mich.	132,861	34	3	.....	.....	.....	1	.....	2	1
Granite City, Ill.	15,890	.....	4	.....	.....	.....	4	.....	.....	.....
Great Falls, Mont.	[1] 13,948	10	.....	.....	.....	.....	.....	.....	.....	2
Greely, Colo.	11,942	4	.....	.....	.....	.....	.....	.....	1	.....
Green Bay, Wis.	30,017	7	.....	.....	.....	.....	1	.....	.....	.....
Greenfield, Mass.	12,251	2	.....	.....	.....	.....	1	.....	.....	.....
Greensboro, N. C.	20,171	3	.....	.....	.....	.....	.....	.....	.....	.....
Greensburgh, Pa.	15,881	.....	1	.....	4	.....	2	.....	.....	.....
Greenwich, Conn.	19,594	2	.....	.....	1	.....	2	.....	.....	.....
Hackensack, N. J.	17,412	3	.....	.....	2	.....	1	.....	.....	.....
Hammond, Ind.	27,016	11	1	.....	1	.....	.....	.....	.....	1
Hancock, Mich.	12,578	0	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg, Pa.	73,276	.....	.....	.....	2	.....	3	.....	.....	.....
Harrison, N. J.	17,345	.....	1	.....	2	.....	1	.....	.....	.....
Hartford, Conn.	112,831	46	8	.....	.....	.....	15	.....	1	.....
Haverhill, Mass.	49,180	9	3	.....	.....	.....	.....	.....	5	1
Hazelton, Pa.	28,981	.....	1	.....	8	.....	.....	.....	.....	.....
Hibbing, Minn.	17,550	.....	3	.....	.....	.....	.....	.....	.....	.....
Highland Park, Mich.	33,859	10	9	.....	1	.....	5	.....	.....	.....
Hoboken, N. J.	78,324	5	5	.....	4	.....	1	.....	1	.....
Holland, Mich.	12,459	1	2	.....	.....	.....	.....	.....	.....	.....
Holyoke, Mass.	66,503	15	1	.....	46	.....	7	.....	.....	.....
Homestead, Pa.	23,071	.....	1	.....	.....	.....	.....	.....	.....	.....
Hot Springs, Ark.	17,690	11	1	.....	.....	.....	.....	.....	1	.....
Houston, Tex.	116,878	31	13	1	.....	.....	.....	.....	.....	2
Hudson, N. Y.	12,898	5	.....	.....	.....	.....	.....	.....	.....	.....
Huntington, Ind.	10,982	1	.....	.....	.....	.....	.....	.....	.....	.....
Huntington, W. Va.	47,686	10	3	.....	.....	.....	2	.....	.....	.....
Hutchinson, Kans.	21,461	.....	.....	.....	.....	.....	5	.....	.....	.....
Independence, Mo.	11,964	9	2	.....	2	.....	.....	.....	.....	.....
Indianapolis, Ind.	283,622	76	8	2	9	.....	17	.....	3	7
Ironton, Ohio.	14,079	2	.....	.....	.....	.....	1	.....	1	.....
Ironwood, Mich.	15,095	9	.....	.....	.....	.....	.....	.....	.....	.....
Irvington, N. J.	16,710	.....	.....	.....	.....	.....	2	.....	.....	.....
Ishpeming, Mich.	[1] 12,448	3	.....	.....	.....	.....	1	.....	.....	.....
Ithaca, N. Y.	16,017	6	.....	.....	.....	.....	.....	.....	.....	.....
Jamestown, N. Y.	37,431	18	3	.....	1	.....	1	.....	1	.....
Janesville, Wis.	14,411	3	.....	.....	1	.....	4	.....	.....	.....
Jersey City, N. J.	312,557	.....	13	.....	28	.....	5	.....	7	.....
Johnstown, Pa.	70,473	.....	12	.....	136	.....	2	.....	.....	.....
Kalamazoo, Mich.	50,408	24	3	.....	1	.....	6	.....	5	1
Kankakee, Ill.	14,270	5	.....	.....	.....	.....	1	.....	.....	.....
Kansas City, Kans.	102,096	.....	2	.....	.....	.....	4	.....	3	.....
Kansas City, Mo.	305,816	94	18	1	36	3	13	.....	3	4
Kearny, N. J.	24,325	6	1	.....	.....	.....	1	1	1	1
Keene, N. H.	10,725	3	.....	.....	.....	.....	.....	.....	.....	.....
Kenosha, Wis.	32,833	9	1	1	.....	.....	.....	.....	.....	.....
Kewanee, Ill.	13,607	2	.....	.....	.....	.....	1	.....	.....	.....
Knoxville, Tenn.	59,112	.....	2	1	.....	.....	2	.....	4	4
Kokomo, Ind.	21,929	4	.....	.....	.....	.....	.....	.....	2	2
Lackawanna, N. Y.	16,219	1	.....	.....	.....	.....	.....	.....	.....	.....
La Crosse, Wis.	31,833	6	.....	.....	.....	.....	.....	.....	.....	.....
La Fayette, Ind.	21,481	.....	.....	.....	2	.....	.....	.....	.....	.....

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Lancaster, Ohio	16,086	5								
Lancaster, Pa.	51,437		11		1		2		4	
Laurel, Miss.	12,313			2			1			
Lawrence, Kans.	13,477	3								
Lawrence, Mass.	102,923	27	4	1	1		4	1	1	3
Leavenworth, Kans.	[1] 19,363	8	1				2			
Leominster, Mass.	21,365	5					5			
Lexington, Ky.	41,997	19			2				2	4
Lima, Ohio	37,145	14			2		5			2
Lincoln, Nebr.	46,957	13					1			
Little Rock, Ark.	58,716		4				2			
Lockport, N. Y.	20,028	8							1	1
Logansport, Ind.	21,338	5			13		7			
Long Beach, Calif.	29,163	17							2	
Long Branch, N. J.	15,733	5			1		3			
Lorain, Ohio	38,266				6		1		2	
Los Angeles, Calif.	535,485	153	17		7		10		60	29
Louisville, Ky.	240,808	54	16		1		7		9	3
Lowell, Mass.	114,366	21	4		1		12		1	3
Ludington, Mich.	10,566	12								
Lynchburg, Va.	33,497	14	1				1			2
Lynn, Mass.	104,534	28	13	3	1		24	1	1	3
McKeesport, Pa.	48,299		1		2					
McKees Rocks, Pa.	20,795		3		3		1		1	
Madison, Wis.	31,315	4			5					
Mahanoy City, Pa.	17,709		6		5					
Malden, Mass.	52,243	13	4		2		3		1	2
Manchester, Conn.	15,859	0	1				1			
Manchester, N. H.	79,607	22	4	1				1	2	1
Manitowoc, Wis.	13,931	10	2		2		4			
Mankato, Minn.	[1] 10,365	7	1		4					
Marinette, Wis.	[1] 14,610	7			1		1			1
Marion, Ind.	19,923	3	2		3		1			
Marion, Ohio	24,129		2				1			
Marquette, Mich.	12,555	3	1		1					
Marshalltown, Iowa	14,519						1			
Martinsburg, W. Va.	12,984		4				1			
Mason City, Iowa	14,938	9	2		28		2			
Mattoon, Ill.	12,764		1		24		2			
Medford, Mass.	26,681	14	1		4		3			
Melrose, Mass.	17,724	2			3		2		1	
Memphis, Tenn.	151,877	52	10				6		7	3
Meriden, Conn.	[1] 29,431		1	2			4			
Methuen, Mass.	14,320	3	4	1			1			
Middletown, N. Y.	15,890		1							
Middletown, Ohio	16,384	6	1	1			2			1
Milford, Mass.	14,280	4	6		1				1	
Milwaukee, Wis.	445,008	92	32	2	22		23	2	17	6
Minneapolis, Minn.	373,448	74	9				1	1	15	8
Mishawaka, Ind.	17,083	3					1			1
Missoula, Mont.	19,075	6					2			1
Mobile, Ala.	59,201	19	4				3			1
Moline, Ill.	27,976	5			4		1			1
Monessen, Pa.	23,070		2		10		6			
Monmouth, Ill.	10,346	4								1
Montclair, N. J.	27,087	6	1							
Montgomery, Ala.	44,039	10	2							
Morgantown, W. Va.	14,444	7	1				4			
Morristown, N. J.	13,410	2					3			1
Mount Vernon, N. Y.	37,991	9	1	1	35		1		4	
Muscatine, Iowa	17,713		2							
Muskogee, Okla.	47,173		2				1			
Nanticoke, Pa.	23,811						1			
Nashua, N. H.	27,541	7					2			
Nashville, Tenn.	118,136	43	9		1		8		2	5
Newark, N. J.	418,789	110	27	1	84	1	23		32	11
Newark, Ohio	30,317	5					1			
New Bedford, Mass.	121,622	40	3		82		7			2
New Britain, Conn.	55,385	12	2				6		2	1
New Brunswick, N. J.	25,855		2				1			

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Newburgh, N. Y.	29,893	15	1				1		1	
Newburyport, Mass.	15,291	5								
New Castle, Ind.	14,144	2			3		1			
New Castle, Pa.	41,915	5			4		5			
New Haven, Conn.	152,275	30	22	1	51		8		1	3
New Orleans, La.	377,010	147	14	1			5		34	23
Newton, Mass.	44,345	9			1		6			
New York, N. Y.	5,737,492	1,288	296	20	1,012	18	124	1	172	129
Niagara Falls, N. Y.	38,466	10	1		50	1	1		2	1
Norristown, Pa.	31,969		3		1					
North Adams, Mass.	[1] 22,019	3							1	
Northampton, Mass.	20,006	13			1		1			
North Attleboro, Mass.	11,248	3					2			
North Braddock, Pa.	15,684				25					
North Tonawanda, N. Y.	14,060	1					3			
Norwalk, Conn.	27,332	5			1					1
Norwich, Conn.	21,923	6	3							
Oakland, Calif.	206,405		2		49		9		7	2
Oak Park, Ill.	27,816	11	3				8			
Ogdensburg, N. Y.	16,845	4								
Ogden, Utah.	32,343	11					2			
Oil City, Pa.	20,162		1							
Oklahoma City, Okla.	97,588*	26	2		2		4			
Olean, N. Y.	16,927	3								
Omaha, Nebr.	177,777	45	9	1	1		16			2
Orange, Conn.	14,393	7	1						1	2
Orange, N. J.	33,636	16	1				1			1
Oshkosh, Wis.	36,549	12	1							1
Paducah, Ky.	25,178								2	
Parkersburg, W. Va.	21,059	3	4							
Parsons, Kans.	15,952		2				1			
Pasadena, Calif.	49,620	9	4	1			2		4	
Passaic, N. J.	74,478	16	9		2		1			1
Paterson, N. J.	140,512	3	5		4				7	
Pawtucket, R. I.	60,666	16	3				9			
Peekskill, N. Y.	19,034	3								1
Pekin, Ill.	10,973		1							
Perth Amboy, N. J.	42,646	11	1							1
Petersburg, Va.	25,817	9	2						2	
Philadelphia, Pa.	1,735,514	378	95	7	131		79	1	69	30
Phillipsburg, N. J.	15,879	3	1							
Piqua, Ohio.	14,275	6	1							
Pittsburgh, Pa.	586,196		38		51		20		17	
Pittsfield, Mass.	39,678	7	1	1					1	1
Pittston, Pa.	18,975		2		7					
Plainfield, N. J.	24,330	4	3		27	1			3	
Plattsburg, N. Y.	13,111	8								1
Plymouth, Mass.	14,001	2								
Plymouth, Pa.	19,439		3							
Pontiac, Mich.	18,006	9	6		39	1				
Port Huron, Mich.	[1] 18,863	5	4		58		2			
Portland, Me.	64,720	10			1		7			1
Portland, Oreg.	308,399	61	7	1	4		10		2	6
Portsmouth, N. H.	11,730		1				2			
Portsmouth, Va.	40,693	14	2						5	1
Pottsville, Pa.	22,717		5							
Providence, R. I.	259,895	69	21	4			21			6
Quincy, Ill.	36,832	6	2							1
Quincy, Mass.	39,022	6	1		2		7		1	1
Racine, Wis.	47,465	16			2		9			
Rahway, N. J.	10,361	4								
Raleigh, N. C.	20,274	8	2				4			
Reading, Pa.	111,607		10		3		1			
Redlands, Calif.	14,573	1							2	
Reno, Nev.	15,514	2								
Richmond, Ind.	25,080	7			1		2		2	
Richmond, Va.	158,702	44	8		9		5		5	4
Riverside, Calif.	20,496	11	1							
Roanoke, Va.	46,282	13	2							1
Rochester, N. Y.	204,714	63	21	2	78		12		11	2

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Rockford, Ill.	56,739	10	2	.....	.....	.....	1	.....	.....	.....
Rock Island, Ill.	29,452	9	2	.....	.....	.....	2	.....	.....	.....
Rocky Mount, N. C.	12,673	3	1	.....	.....	.....	1	.....	.....	1
Rome, Ga.	15,607	.....	1	.....	.....	.....	.....	.....	7	.....
Rome, N. Y.	24,259	.....	2	.....	.....	.....	1	.....	1	.....
Rutland, Vt.	15,038	4	.....	.....	.....	.....	.....	.....	.....	.....
Sacramento, Calif.	68,984	25	.....	.....	2	.....	1	.....	.....	3
Saginaw, Mich.	56,469	21	6	.....	70	.....	.....	.....	.....	2
St. Joseph, Mo.	86,498	30	1	.....	.....	.....	1	.....	.....	5
St. Louis, Mo.	768,630	212	102	14	79	.....	30	.....	13	9
St. Paul, Minn.	252,465	54	7	.....	5	.....	9	.....	6	1
Salem, Mass.	49,346	6	6	.....	.....	.....	4	1	.....	1
Salem, Oreg.	21,274	6	.....	.....	.....	.....	.....	.....	.....	1
Salt Lake City, Utah.	121,623	37	2	.....	.....	.....	1	.....	1	3
San Angelo, Tex.	[1] 10,321	0	.....	.....	.....	.....	.....	.....	.....	.....
San Bernardino, Calif.	17,616	5	.....	.....	.....	.....	.....	.....	.....	2
San Diego, Calif.	56,412	20	2	.....	1	.....	4	.....	4	4
Sandusky, Ohio.	20,226	2	1	.....	.....	.....	.....	.....	.....	.....
Sanford, Me.	11,217	1	.....	.....	10	.....	4	.....	.....	.....
San Francisco, Calif.	471,023	181	.....	2	.....	1	.....	1	.....	14
San Jose, Calif.	39,810	.....	2	.....	4	.....	1	.....	.....	.....
Santa Barbara, Calif.	15,360	3	.....	.....	.....	.....	.....	.....	.....	.....
Santa Cruz, Calif.	15,150	8	.....	.....	.....	.....	1	.....	.....	.....
Saratoga Springs, N. Y.	13,839	3	1	.....	.....	.....	.....	.....	.....	.....
Saugus, Mass.	10,210	1	.....	.....	.....	.....	.....	.....	.....	.....
Sault Ste. Marie, Mich.	14,130	1	.....	.....	17	.....	4	.....	.....	.....
Savannah, Ga.	69,250	46	4	.....	.....	.....	2	.....	.....	7
Schenectady, N. Y.	103,774	18	2	.....	1	.....	2	.....	2	3
Scranton, Pa.	149,541	.....	12	.....	17	.....	18	.....	2	.....
Seattle, Wash.	366,445	.....	3	.....	80	.....	5	.....	.....	.....
Shamokin, Pa.	21,274	.....	5	.....	10	.....	1	.....	.....	.....
Sharon, Pa.	19,156	.....	1	.....	1	.....	1	.....	.....	.....
Shelbyville, Ind.	11,201	2	.....	.....	.....	.....	2	.....	.....	.....
Shenandoah, Pa.	29,753	.....	3	.....	.....	.....	1	.....	.....	.....
Sioux City, Iowa.	58,268	.....	2	.....	.....	.....	2	.....	.....	.....
Sioux Falls, S. Dak.	16,887	12	.....	.....	.....	.....	3	1	.....	1
Somerville, Mass.	88,618	22	1	1	7	.....	3	.....	1	2
South Bend, Ind.	70,967	17	.....	.....	1	.....	8	.....	.....	.....
Southbridge, Mass.	14,465	1	.....	.....	.....	.....	.....	.....	.....	.....
Spokane, Wash.	157,656	.....	1	.....	.....	.....	4	.....	.....	.....
Springfield, Ill.	62,623	.....	2	.....	.....	.....	1	.....	.....	.....
Springfield, Mass.	108,668	34	5	.....	.....	.....	6	.....	5	.....
Springfield, Mo.	41,169	18	.....	.....	.....	.....	.....	.....	.....	.....
Springfield, Ohio.	52,296	15	.....	.....	.....	.....	1	.....	1	.....
Stanford, Conn.	31,810	.....	1	.....	8	.....	1	.....	.....	.....
Staunton, Va.	11,823	2	1	.....	.....	.....	1	.....	.....	.....
Steelton, Pa.	15,759	.....	.....	.....	.....	.....	.....	.....	1	.....
Steubenville, Ohio.	28,259	12	1	.....	.....	.....	.....	.....	1	.....
Stillwater, Minn.	[1] 10,198	1	.....	.....	.....	.....	.....	.....	.....	.....
Stockton, Calif.	36,209	11	.....	.....	1	.....	1	.....	.....	.....
Sunbury, Pa.	16,661	.....	8	.....	.....	.....	2	.....	.....	.....
Superior, Wis.	47,167	8	.....	.....	1	.....	1	.....	.....	1
Syracuse, N. Y.	158,559	36	4	.....	2	.....	4	.....	11	3
Tacoma, Wash.	117,446	.....	4	.....	1	.....	1	.....	.....	.....
Taunton, Mass.	36,610	19	.....	.....	1	.....	.....	.....	1	.....
Terre Haute, Ind.	67,361	16	1	.....	1	.....	2	.....	.....	3
Tiffin, Ohio.	12,962	8	.....	.....	.....	.....	1	.....	.....	.....
Toledo, Ohio.	202,010	53	13	1	154	.....	19	.....	3	5
Topeka, Kans.	49,538	21	4	.....	3	.....	.....	.....	.....	1
Trenton, N. J.	113,974	25	9	.....	8	.....	2	.....	3	1
Troy N. Y.	78,094	20	1	1	.....	.....	3	.....	3	.....
Tucson, Ariz.	17,324	10	.....	.....	.....	.....	.....	.....	.....	.....
Vallejo, Calif.	13,803	7	8	2	.....	.....	.....	.....	.....	.....
Vancouver, Wash.	13,805	.....	.....	.....	.....	.....	1	.....	.....	.....
Waco, Tex.	34,015	7	.....	.....	.....	.....	.....	.....	.....	.....
Waltham, Mass.	31,011	9	.....	.....	2	.....	2	.....	1	1
Warren, Pa.	15,085	.....	.....	.....	.....	.....	.....	.....	1	.....
Washington, D. C.	369,282	122	21	3	2	.....	17	.....	17	14
Washington, Pa.	22,076	.....	2	.....	.....	.....	1	.....	.....	.....
Waterbury, Conn.	89,201	.....	5	1	1	.....	5	.....	1	.....

[1] Population Apr. 15, 1910.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City Reports for Week Ended Dec. 27, 1919—Continued.

City.	Population as of July 1, 1917 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Watertown, Mass	15,188	1	.....	.....	3	.....	.....	.....	.....	.....
Watertown, N. Y	30,404	0	7	.....	.....	.....	2	.....	.....	.....
Wausau, Wis	19,666	5	.....	.....	.....	.....	.....	.....	.....	.....
Webster, Mass	13,484	2	.....	.....	.....	.....	.....	.....	.....	.....
West Chester, Pa	13,403	.....	1	.....	.....	.....	5	.....	1	.....
Westfield, Mass	18,769	3	.....	.....	.....	.....	.....	.....	.....	.....
West Hoboken, N. J	44,386	4	.....	.....	.....	.....	.....	.....	2	.....
West New York, N. J	19,613	4	.....	.....	1	.....	.....	.....	1	.....
West Orange, N. J	13,964	1	1	.....	.....	.....	2	.....	2	.....
Wheeling, W. Va	43,657	12	2	.....	9	.....	.....	.....	.....	2
White Plains, N. Y	23,311	2	.....	.....	1	.....	2	.....	.....	.....
Wichita, Kans	73,597	23	4	.....	1	.....	3	.....	4	2
Wilkes-Barre, Pa	78,334	.....	4	.....	1	.....	6	.....	1	.....
Wilkinsburg, Pa	23,899	.....	1	.....	14	.....	3	.....	.....	.....
Williamsport, Pa	34,123	.....	.....	.....	.....	.....	1	.....	.....	.....
Wilmington, Del	95,369	20	5	2	.....	.....	3	.....	.....	2
Winchester, Mass	10,812	2	.....	.....	.....	.....	.....	.....	.....	.....
Windham, Conn (town)	14,404	.....	.....	.....	.....	.....	1	.....	.....	.....
Winona, Minn	[1] 18,583	5	.....	.....	5	.....	.....	.....	.....	.....
Winston-Salem	33,136	14	.....	.....	.....	.....	.....	.....	5	2
Winthrop, Mass	13,105	3	.....	.....	.....	.....	.....	.....	.....	.....
Woburn, Mass	16,076	2	.....	.....	.....	.....	.....	.....	.....	.....
Worcester, Mass	166,106	48	1	.....	.....	.....	1	.....	3	5
Yakima, Wash	22,058	.....	2	.....	.....	.....	1	.....	23	.....
Yonkers, N. Y	103,066	22	17	.....	17	.....	2	.....	.....	2
York, Pa	52,770	.....	4	.....	100	.....	25	.....	1	.....
Zanesville, Ohio	31,320	8	.....	.....	1	.....	1	.....	.....	.....

[1] Population Apr. 15, 1910.

FOREIGN AND INSULAR.

CHINA.

Human Anthrax—Hankow.[1]

A case of anthrax occurring in a foreign hide inspector was notified at Hankow, China, during the week ended November 29, 1919.

CHOSEN (KOREA).

Cholera—Aug. 15–Nov. 16, 1919.

Cases of cholera and deaths therefrom were reported in Chosen (Korea) during the period from August 15 to November 16, 1919, as follows:

Province.	Cases.	Deaths.	Province.	Cases.	Deaths.
Keiki	224	135	South Chusei	930	590
Kogen	64	38	South Heian	3,031	1,858
Kokai	4,015	2,770	South Kankyo	870	551
North Chusei	1	1	South Keisho	318	156
North Heian	3,196	2,434	South Zenra	657	288
North Kankyo	497	275			
North Keisho	63	35	Total	15,192	9,823
North Zenra	1,326	692			

FINLAND.

Anthrax in Animals—September–October, 1919.

During the month of September, 1919, two cases of anthrax in animals were reported in Finland. The cases occurred in the Provinces of Nyland and Abo Och Borneborg. During the month of October, 1919, 8 cases were reported, occurring in Provinces as follows: Abo Och Borneborg, 2 cases; Nyland, 3 cases; Vasa, 1 case; Viborg, 2 cases.

INFLUENZA.

The following information was taken from reports received during the week ended January 16, 1920:

Place.	Date.	Cases.	Deaths.	Remarks.
Australia:				
Brisbane	Nov. 9–15	1		
Sydney	Nov. 9–29			Present. Pneumonic.
South Australia	Oct. 6–Nov. 17	150	10	Entire State.
China:				
Antung	Dec. 1–7	24	2	
Hankow	Nov. 23–29			Prevalent, among Europeans, with bronchial symptoms.
Norway:				
Christiania	Nov. 30–Dec. 6		1	
Spain:				
Malaga	Dec. 1–10		1	
Valencia	Dec. 7–20	49	39	
Sweden:				
Goteborg	Nov. 16–29	130		
Malmo	....do	22		

[1] Public Health Reports, Jan. 2, 1920, p. 57.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER.

Reports Received During Week Ended Jan. 16, 1920.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
Chosen (Korea)				Oct. 20-Nov. 16, 1919: Cases, 3,525; deaths, 3,144. Aug. 15-Nov. 16, 1919: Cases, 15,192; deaths, 9,823.
Provinces—				
Keiki	Aug. 15-Nov. 16	224	135	
Kogen	do	64	38	
Kokai	do	4,015	2,770	
North Chusei	do	1	1	
North Heian	do	3,196	2,434	
North Kankyo	do	397	275	
North Keisho	do	63	35	
North Zenra	do	1,326	692	
South Chusei	do	930	590	
South Heian	do	3,031	1,858	
South Kankyo	do	870	551	
South Keisho	do	318	156	
South Zenra	do	657	288	
Greece:				
Saloniki	Oct. 10	1		
India:				
Bombay	Nov. 2-8	1	1	
Philippine Islands:				
Manila	Nov. 23-29		1	
Provinces				Nov. 23-29, 1919: Cases, 185; deaths, 120.
Albay	Nov. 23-29	33	21	
Antique	do	3	1	
Batangas	do	15	8	
Cavite	do		3	
Cebu	do	6	4	
Ilocos Norte	do	1	1	
Iloilo	do	6	6	
Laguna	do	10	7	
Mindoro	do	2	1	
Occidental Negros	do	7	4	
Pangasinan	do	18	11	
Rizal	do	7	4	
Sorsogon	do	68	43	
Tarlac	do	3	3	
Tayabas	do	6	3	
Poland:				
Garwolin				Present in November, 1919.
Kowal				Do.
Stryi				Do.
Siam:				
Bangkok	Oct. 19-Nov. 8		31	

PLAGUE.

Ecuador:				
Guayaquil	Nov. 1-30	1		
Egypt				Jan. 1-Nov. 20, 1919: Cases, 813; deaths, 445.
Province—				
Assiout	Nov. 15-20	15	8	
Greece:				
Saloniki	Nov. 17-30	5	3	25 cases reported among French troops.
India				Nov. 2-8, 1919: Cases, 1,701; deaths, 1,338.
Bombay	Nov. 2-8	1	1	
Peru:				
Salaverry	Nov. 23-29	3	1	
Turkey:				
Constantinople	Nov. 14-20	10		
On vessel:				
S. S. Kaisar-i-Hind	Nov. 28	3		At Port Said, Egypt. From Bombay Nov. 15, 1919, for London.

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended Jan. 16, 1920—Continued.

SMALLPOX.

Place.	Date.	Cases.	Deaths.	Remarks.
Algeria:				
Departments—				
Algiers	Dec. 1-11	5		
Constantine	do	3		
Oran	do	20		
Canada:				
British Columbia—				
Vancouver	Nov. 30-Dec. 6	1		
Nova Scotia—				
Halifax	Dec. 21-27	2		
Ontario—				
Hamilton	Dec. 28-Jan. 3	3		
Kingston	Dec. 21-27	1		
Toronto	Dec. 14-27	456		
Windsor	Dec. 21-27	1		
Quebec—				
Montreal	do	1		
Quebec	do	3		
Saskatchewan—				
Saskatoon	Dec. 14-20	1		
China:				
Canton	Nov. 16-29			Present.
Egypt:				
Alexandria	Nov. 19-Dec. 2	11	5	
Finland				Oct. 15-31, 1919: Cases, 6.
Provinces—				
Nyland	Oct. 15-31	4		Helsingfors.
Tavastehus	do	1		Rural district.
Viborg	do	1		Do.
Finland				Nov. 1-15, 1919: Cases, 27.
Provinces—				
Abo Och Borneborg	Nov. 1-15	1		Rural district.
Nyland	do	16		Helsingfors.
St. Michael	do	5		Rural district.
Tavastehus	do	1		Do.
Vasa	do	4		Do.
Germany				Oct. 5-11, 1919: Cases, 32. In addition to previously reported cases, Sept. 28-Oct. 4, 1919: Cases, 26.
India:				
Bombay	Nov. 2-8	4	1	
Italy:				
Messina	Nov. 24-30	3	3	
Mexico:				
Chihuahua	Dec. 21-27	2		
Mexico City	Nov. 30-Dec. 6	3		
Newfoundland:				
St. Johns	Dec. 20-26	3		Dec. 13-26, at outports, 6 cases. Present at 8 other localities.
Panama:				
Colon	Dec. 15-21	1		
Spain:				
Valencia	Dec. 7-20	16	4	
Vigo	Dec. 1-13		8	
Union of South Africa:				
Johannesburg	Oct. 1-31	10		
On vessel:				
S. S. Sarcoxie	Dec. 23	1		At Ponta Delgada, Azores. From Rotterdam, for New York.

TYPHUS FEVER.

Algeria:				
Oran	Dec. 5-11	1		Department.
Austria				Sept. 7-14, 1919: Cases, 7.
Vienna	Sept. 7-14	5		
Egypt:				
Alexandria	Nov. 19-Dec. 2	5	2	
Germany				Oct. 5-25, 1919: Cases, 10—civil population, 3; military, 7.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended Jan. 16, 1920—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Greece:				
Cavalla	Nov. 17-23	1		
Drama	Nov. 24-30	1		
Saloniki	Nov. 17-23	4	3	
Hungary				Aug. 25-Sept. 14, 1919: Cases, 6.
Japan:				
Nagasaki	Dec. 1-7	2		
Mexico:				
Chihuahua	Dec. 21-27	2		
San Luis Potosi	....do....			Present.

Reports Received from Dec. 27, 1919, to Jan. 9, 1920.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
China:				
Amoy	Nov. 4-17		2	
Chosen:				
Chemulpo	Oct. 1-31	8	4	
Fusan	....do....	34	30	
India:				
Calcutta	Oct. 26-Nov. 8	23	23	
Japan:				
Kobe	Nov. 24-30	2		
Taiwan				For entire island: Oct. 22-Nov. 20, 1919: Cases, 645; deaths, 374.
Tokyo	Nov. 10-20	1	1	
Java:				
East Java				Oct. 5-11, 1919: One case, 1 death. At Pasoeroean.
Philippine Islands:				
Manila	Nov. 2-22	12	6	
Provinces				Nov. 2-22, 1919: Cases, 908; deaths, 723.
Albay	Nov. 2-22	274	191	
Ambos Camarines	....do....	39	20	
Antique	....do....	15	9	
Batangas	....do....	32	22	
Bohol	....do....	19	16	
Cagayan	Nov. 3-15	35	20	
Capiz	Nov. 2-8	6	5	
Cavite	Nov. 2-22	12	10	
Cebu	....do....	15	9	
Davao	Nov. 9-15	6	4	
Ilocos Norte	Nov. 2-22	46	39	
Ilocos Sur	....do....	18	15	
Iloilo	....do....	32	16	
Isabela	Nov. 2-15	111	49	
Laguna	....do....	7	4	
Mindoro	Nov. 2-22	74	27	
Mountain	....do....	6	4	
Occidental Negros	Nov. 2-22	58	35	
Pangasinan	....do....	11	8	
Rizal	....do....	29	10	
Sorsogon	....do....	93	63	
Tarlac	....do....	8	8	
Tayabas	....do....	32	25	
Union	Nov. 9-15	5	5	
Siam:				
Bangkok	Oct. 5-18		4	
Straits Settlements:				
Singapore	Oct. 5-Nov. 1	13	12	

[1] From medical officers of the Public Health Service, American consuls, and other sources. For reports received from June 28 to Dec. 26, 1919, see Public Health Reports for Dec. 26, 1919. The tables of epidemic diseases are terminated semiannually and new tables begun.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 27, 1919, to Jan. 9, 1920—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
British East Africa:				
Kisumu	Sept. 28-Nov. 1	6	6	
Ceylon:				
Colombo	Oct. 26-Nov. 8	14	14	
Greece:				
Saloniki	Oct. 6-Nov. 16	13	4	
India				Oct. 19-Nov. 1, 1919: Cases, 4,070; deaths, 3,044.
Bombay	Oct. 19-Nov. 18	2	2	
Karachi	Nov. 9-15	1	1	
Madras Presidency	Nov. 9-22	329	207	
Rangoon	Nov. 2-8	5	3	Oct. 19-Nov. 1, 1919: Cases, 10; deaths, 7.
Java:				
East Java				Sept. 28-Oct. 18, 1919: Cases, 121; deaths, 121.
Straits Settlements:				
Singapore	Oct. 26-Nov. 2		1	

SMALLPOX.

Algeria:				
Departments—				
Algiers	Nov. 11-30	29		
Constantine	do	10		
Oran	do	35		
Bolivia:				
La Paz	June 29-Nov. 28		174	Dec. 29-June 28, 1919: Cases, 86; deaths, 44.
Canada:				
Nova Scotia—				
Sydney	Dec. 7-13	1		Counties: Dec. 10-20, 1919: Present.
Ontario				Nov. 30-Dec. 6, 1919: Cases, 125.
Hamilton	Dec. 14-20	3		In 45 localities, exclusive of Dysart and Toronto.
Ottawa	do	1		
Peterborough	Dec. 7-29	4		
Sault Ste. Marie	do	1		
Toronto	Dec. 7-13	271		
Windsor	Dec. 14-20	1		
Quebec—				
Montreal	Dec. 7-20	2		
Quebec	Dec. 7-13	1		
China:				
Amoy	Nov. 4-10			Present.
Canton	Nov. 2-8			Do.
Chungking	Nov. 2-15			Do.
Chosen (Korea):				
Fusan	Oct. 1-31	2	1	
Seoul	do	9	1	
Colombia:				
Barranquilla	Nov. 16-29	50	1	
Egypt:				
Alexandria	Nov. 12-18	6	4	
Cairo	Oct. 1-14	18	9	
Port Said	Oct. 1-7	1		
Finland:				
Provinces—				
Nyland	July 16-31	1		
Tavastehus	do	1		
Viborg	do	23		
Greece:				
Saloniki	Nov. 10-22	9	8	
India:				
Bombay	Oct. 12-25	6	2	
Calcutta	Oct. 26-Nov. 8	11	8	
Madras	Nov. 2-13	10	7	
Rangoon	Oct. 19-Nov. 8	21	11	
Italy:				
Genoa	Nov. 16-22	5		
Messina	Nov. 10-16	7	3	
Japan:				
Taiwan	Nov. 1-20	10	2	Entire island.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 27, 1919, to Jan. 9, 1920—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Java:				
East Java				Sept. 28–Oct. 18, 1919: Cases, 12.
West Java				Oct. 17–29, 1919; Cases, 117; deaths, 31.
Batavia	Oct. 17–29	11	3	
Mexico:				
Acapulco	Nov. 9–15	2		
Mexico City	Nov. 16–22	5		
San Luis Potosi	Dec. 14–20		1	
Portugal:				
Lisbon	do		15	
Spain:				
Barcelona	Nov. 6–12		2	
Cadiz	Oct. 1–31		5	
Valencia	Nov. 10–Dec. 6	17	4	
Vigo	Nov. 18–30		6	
Tunis:				
Tunis	Dec. 23–29	1		
Turkey:				
Constantinople	Nov. 9–15	5		

TYPHUS FEVER.

Algeria:				
Departments—				
Constantine	Nov. 11–30	2		
Oran	Nov. 21–30	2		
Bolivia:				
La Paz	June 29–Nov. 22		24	Dec. 29–June 28, 1919: Deaths, 52.
Chile:				
Antofagasta	Nov. 17–30	10		
Valparaiso	Nov. 9–22	275	41	
China:				
Antung	Nov. 3–9	1		
Egypt:				
Alexandria	Nov. 12–18	4	1	
Cairo	Oct. 1–14	27	8	
Port Said	do	1		
Finland:				
Province—				
Viborg	July 16–31	2		
Great Britain:				
Glasgow	Nov. 30–Dec. 6	2		
Greece:				
Saloniki	Oct. 6–Nov. 2		38	
Italy:				
Venice	Nov. 17–23	4	1	
Mexico:				
Mexico City	Nov. 16–22	46		
San Luis Potosi	Dec. 14–20			Present.
Spain:				
Corunna	Nov. 24–Dec. 7	2		
Turkey:				
Constantinople	Nov. 14–20	3		

YELLOW FEVER.

Mexico:				
Merida	Dec. 7–20	3	2	The cases were sent from Opichen, vicinity of Muna. One death in case from Muna. Total to Dec. 20: Cases, 46; deaths, 20.